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ARNOLDIA



A continuation of the
BULLETIN OF POPULAR INFORMATION

VOLUME II

1942

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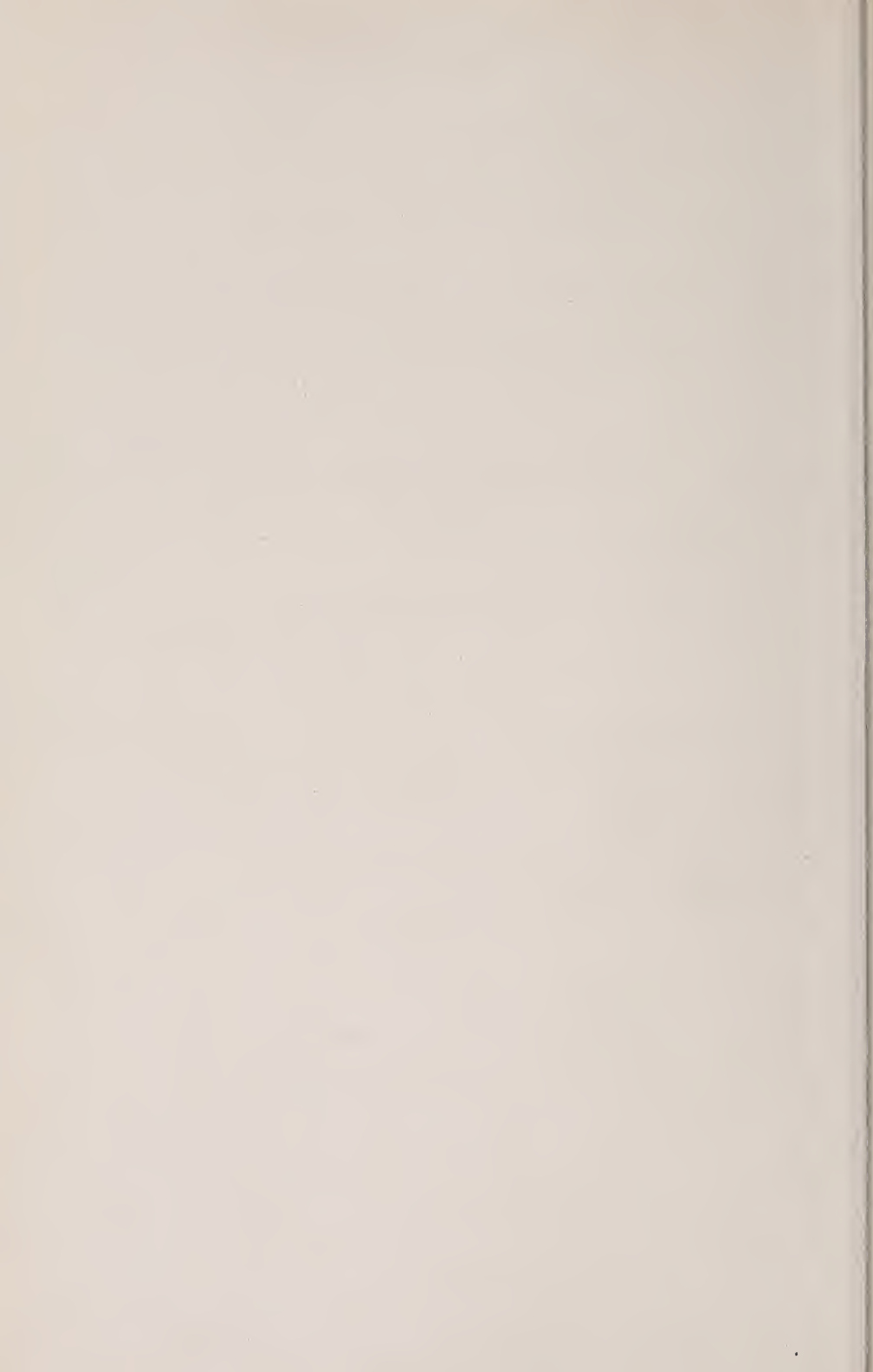
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ARNOLDIA



A continuation of the BULLETIN OF POPULAR INFORMATION of the Arnold Arboretum, Harvard University

VOLUME 2

FEBRUARY 13, 1942

NUMBER 1

FLOWERS OF THE CHINESE NEW YEAR

ONE of the most interesting customs in Canton, China, is that connected with the Chinese New Year, a variable date which may occur, according to the foreign calendar, some time during the month of January or February. On the Chinese New Year (February 15 of this year), every Chinese family in Canton feels the necessity of having in its home some flowers appropriate to the New Year season. All shops are likewise decorated. Every sampan, the home of the boat people, has its splash of color and so does the junk and flower boat. Without this symbol of life, and without the decorations of scarlet-red paper, the spirit of the New Year season seems lacking.

To prepare for the great number of flowers demanded at this holiday season, peonies (*Paeonia suffruticosa* Anderson) are shipped from the north; water lilies are imported from Chungchow, Fukien Province; villagers scour the hillsides for azaleas (*Rhododendron* spp.) and Chinabells (*Enkianthus quinqueflorus* Loureiro), and the peasant or farmer cuts branches from his flowering peach trees (*Prunus persica* Linn.) and brings them to the market. Through long custom two or three areas in Canton have been entirely turned over to this interesting flower market; the most celebrated is that region near the Sap Sam Hong district, but the broad street, Wing On Road is also used to some extent. In these two areas for the two or three days preceding the New Year and especially on the last day of the old year, the streets on both sides are literally lined with thousands upon thousands of flowering branches suitable to the New Year season. The water lilies are placed in shallow porcelain containers or in wooden tubs. The branches of peach and Chinabells are placed in porcelain jars or earthen jugs. Peonies and camellias are attractively arranged on wooden frames. All during the day and especially the last evening of the old year, the streets are crowded with a kaleidoscopic aggregation of cheerful, happy, hurrying, hustling humanity, most eager to purchase flowers for home, boat or shop needed on the morrow. The purchase is always

accompanied by the ever old custom of bargaining and good-natured haggling over prices. The prospective buyer asks the price and receives an answer; if the price is too much, he offers a lower price and if not accepted, he moves away. The owner calls out a slightly lower price but the prospective buyer moves on and tries the same process somewhere else. He may even return to the same seller and begin all over again until he obtains what he thinks is a just price. If, however, the seller agrees to his offer, the purchaser is honor bound to pay, even if the purchaser realizes too late that he has offered too much.

Here one might see a prosperous merchant accompanied by his rickshaw coolie, carrying a large peach tree costing approximately five or six dollars Chinese currency; jostling in the crowd next to him may be a poor ragged, grass-shod, rickshaw coolie, proudly carrying home a small branch of Chinabells (*Enkianthus*), costing possibly only two dimes. Or, one might see a group of well-dressed, hatless, joking, jovial, joyous students in long Chinese dark-blue, padded coats, for the air is cold and brisk; or the ever present short dark-coated merchant or artisan's helper. Occasionally, in the early evening, one might see a group of gorgeous silk-clad, satin embroidered slippered, immaculately groomed, elegantly perfumed and brilliantly jade-bedecked Chinese girls, traveling always in groups or followed by the ever-present servant or "amah." The "amah" acts as a bodyguard, and devotedly attends to the least wish or whim of her mistress. Perchance one might see an Englishman from Shameen, with brown coat, golf trousers and Scotch-plaid golf socks, somewhat aloof, with heavy walking stick and gloves, out for a brisk walk ignoring the crowds, but occasionally stopping to admire or bargain for some choice flowers or an ancient bronze jar.

Relatively few kinds of flowers are used for the New Year festival, the beginning of the first or holiday moon. The commonest flowers used during this holiday season are briefly discussed below.

1. **Chinese New Year Lily, Water Fairy Flower, or Chinese Sacred Lily** (*Narcissus tazetta* Linnaeus), "Shiu Sin Fa."

This represents probably the most common flower of the China New Year festival and the Chinese people adore it for the pure snow-whiteness of its petals and its rich fragrance. This is the same species that is extensively grown in the United States. The contrast of these fragrant blossoms, with narrow elongated rich green leaves, bursting forth from out of the shaggy brown bulbs, symbolizes the beginning of a new year. It is always available and can be obtained at very low prices, ranging from one or two to four or five dimes, depending upon the variety and method of slicing the bulbs. There are two major types: those with split erect bulbs and erect stems with single or double fragrant flowers, and those with peculiarly cut and often horizontally sliced bulbs, resulting in numerous closely compact curved groups of closely associated flowers, giving a crowded horizontal and brilliantly colored mass of fragrant flowers. These are cut in such a way as



Photograph courtesy of Prof. G. W. Groff, Lingnan University, Canton, China.

PLATE I. Chinese New Year scene in Canton, showing both types of Chinese New Year Lily. Note grass used for string, students in old and modern costume, and the merchant in background.

to form beautiful and delicate designs simulating various objects. If the design is especially pleasing the cost is considerably more. These are very fragrant and attractive, and are prepared in such a manner that the blooms will be at their maximum at the beginning of the Chinese New Year. This constitutes quite an industry and has been admirably discussed in a paper by McClure.¹ This industry is confined to a tiny area of about ten hamlets to the east of Yellow Mountain, Wong Shan, in the vicinity of Changchow, Southern Fukien.

This plant and the Camellia are also very commonly used as flower offerings to the various gods in the temples, at which time the bearers ask for sons or prosperity for the New Year.

2. **Chinabells** (*Enkianthus quinqueflorus* Loureiro), "Tiu Chung Fa."

This beautiful example of the Heath family (Ericaceae) is rather common in the nearby mountains and is extensively cut and brought into the market. Its beautiful pendulous clusters of white, pale pink or rose colored bell-like flowers make a very pleasing and appropriate New Year flower. Each cluster may have 4 to 15 flowers and the prospective buyer always tries to purchase the branch that has the most flowers in a cluster. If placed in large water jars, these branches will keep for a period of a week or two, the flowers gradually enlarging in size, later being accompanied by the developing of young, delicate green shoots and leaves which add considerably to the gay color scheme. Large clusters of flowers are supposed to bring good luck.

3. **Peach** (*Prunus persica* Linnaeus and forms), "To."

The large branches and in fact the entire trees of the peach are brought in regularly to the market. There are two or three color forms, ranging from pale pink to coral pink, and some with almost blood-red blossoms. The larger branches or trees are rather expensive and are more commonly seen in the large silk hong (shops) or are purchased by the well-to-do.

4. **Apricot** (*Prunus mume* Sieb. & Zucc.), "Mooi."

This is only occasionally used and is not as common at the New Year time as the peach. It is, however, extensively cultivated in Chinese gardens. The flowers are a pale delicate pink and the double flowering forms are often pure white. The cut branches are not very satisfactory, as the flowers soon drop off.

5. **Tree peony** (*Paeonia suffruticosa* Anderson, *P. moutan* Sims), "Mau Tan."

These are not grown locally in Kwangtung; each year they are shipped down from the north. This shrubby biternate-leaved plant has large beautiful attractive pink flowers, often four to five inches across. The flowers should be fully open on

¹ Hongkong Naturalist Vol. III, p. 186-193, t. 26-29, and fig. 1-2 (1932).



Photographs courtesy of Dr. W. W. Cadbury, Supt. Sun Yat-sen Medical College and Canton Hospital, Lingnan University.

PLATE II. Scenes in Canton before its partial destruction, showing Chinabells.

New Year's day. If the weather is unusually cold, the buds do not open and often the seller is left with hundreds of plants on his hands, as the Chinese will not purchase them if they think the flowers will only be in bud on New Year's day. One rather cold year the gardener in charge of the Lingnan University greenhouse purchased a large number of these plants and forced them in the heated greenhouse, so that the plants that he forced were the only ones to flower in Canton on that particular Chinese New Year; they actually brought fabulous prices in the open market.

This peony has a long history in China; before 600 A.D. it was primarily used for medicinal purposes, but after that date was extensively used as an ornamental. One kind has been used to give to friends as a gift on separation, or often as a family remembrance upon the return of some member after separation, in a way similar to the forget-me-not of America. The tree peony is called "Hwa Wang," or King of Flowers, and has been cultivated extensively by nobility, the literary and the rich; it has become a favorite subject in art, in literature, in ceramics, in textiles, and in prose and poetry. It is often found associated with the Phoenix, the King of Birds, and these two together were extensively embroidered and depicted on the trousseaux of princesses.

6. **Azalea** or *Rhododendron* (*Rhododendron* spp., mostly *R. Ferraræ* Tate, *R. Simsii* Pl. and cultivated forms of *R. indicum* Linnaeus), "To Kuen."

A few years ago the only azaleas found in the New Year market were the native brick-red species (*R. Simsii*) and the delicate lovely lavender-tinted species (*R. Ferraræ*). Whole bushes were dug up from the nearby mountains and brought into the market. More recently Japanese varieties of azaleas have been introduced into the Chinese trade and many beautiful varieties of these are now found during this holiday season. As *R. Simsii* occurs commonly on the nearby mountains, grows vigorously, flowers abundantly, and is endowed with the favored brick red color of the holiday season, it has special significance at this time. By some, however, it is supposed to be a tragic flower, in contrast to its smiling, bright, flashing beauty, and as one legend goes, it was supposed to spring from the tears of blood of the cuckoo. The cuckoo was supposed to be the reincarnation of a boy in search of his lost brother who was persecuted from home by his stepmother.

7. **Camellia** (*Camellia japonica* Linnaeus: *Thea japonica* (L.) Nois.), "Shan Ch'a."

This shrub with beautiful dark green, shining foliage and usually delicate pink flowers is seen in the market either as shapely shrubby bushes, beautifully cultivated in attractive flower pots, or as cut branches. Red and white forms are not often seen during the holiday season. The larger shrubs are expensive.

This flower, as mentioned above, is extensively used as a floral offering to the temple gods when special requests for the New Year are presented. It may be



Photograph courtesy of Prof. G. W. Groff, Lingnan University, Canton, China.

PLATE III. Another Chinese New Year scene, with Chinese Sacred Lily, Peach branches and ornate Chinese porcelain.

mentioned also in passing that this flower is never worn as an ornament in a lady's hair, for the large buds of the Camellia take a whole year to open. To the Chinese this would symbolize the fact that a woman would have to wait one whole year for a son—much too long a period—and so the Camellia is not used by women as a floral decoration. For this purpose the following species are used: "Orchid tree" (*Aglaia odorata* Lour.), "Mai Tsai Lan or Shue Lan"; "Pearl orchid tree" (*Chloranthus spicata* Makino), "Chue Lan"; "White and Yellow Jade Orchid tree" (*Michelia alba* DC., *M. Champaca* Linn.), but not, however, at the Chinese New Year.

8. **Waxflower** or Wintersweet (*Chimonanthus praecox* Linnaeus: *Merätia praecox* Wilson), "Lap Mooi" or "La Mei Hua."

This shrub with the flowers appearing before the leaves is occasionally seen. The delicate waxy yellow flowers with the inner sepals beautifully striped with pale purplish brown, are very fragrant and eagerly sought.

Occasionally other flowers or fruits are found in the market at this season, such as Buddas' fingers (*Citrus medica* Linn. var. *sarcodoctylus* Swingle), flowers of the plum (*Prunus japonica* Thunb.), peculiar fruited species of *Solanum*, various dwarf forms of oranges, kumquats and orchids. It should also be mentioned that there are always a few practical jokers who cunningly and artistically prepare composite sprays of leaves of one species and flowers of another, which they try to sell at high prices because of their rarity, and take great delight in trying to fool the general public. Being a botanist any unusual blossom or fruit at once attracts my attention. The writer remembers, very much to his chagrin, the purchase of one of these beautiful hand-made floral fakes, which his Chinese companion, without saying a word, allowed him to purchase. Upon subsequent investigation this proved to be a clever, temporary, artificial arrangement between two entirely unrelated species. His Chinese companion had a good laugh at the writer's expense.¹

¹ I am however, consoled by the fact that I have not been the only botanist thus "taken in." One of Augustine Henry's Chinese collectors "manufactured" a dried botanical specimen by combining parts of two entirely different species so skillfully that when the specimen was studied at Kew it was described and illustrated as a new genus and a new species, *Actinotinus sinensis* Oliv. in Hook. Ic. 18: t. 1740. 1889. The author indicated in the original description that while the floral characters were those of *Viburnum*, yet the vegetative characters were those of *Aesculus*, the two genera of course belonging in totally unrelated families. The hoax was not detected until a year later when a critical re-examination of the type specimen showed that the collector had so skillfully attached the inflorescence of a species of *Viburnum* to a terminal leafy branch of an *Aesculus* that neither the highly skilled botanist who studied it nor the widely experienced artist who prepared the drawing, detected the artifact at the time the description and the drawing were prepared.

FRANKLIN P. METCALF

ARNOLDIA



A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 2

MARCH 13, 1942

NUMBER 2

NURSERY SOURCES FOR NUT TREES

IN a recent number of *Arnoldia* entitled "Nut Growing in the Northeastern States" (*Arnoldia*, Vol. 1; 45-64; Oct. 31, 1941) over sixty varieties of nuts were recommended for trial in the northeastern United States. In the past, some of our practical minded readers have offered the just criticism that such published information is not nearly as valuable as if actual sources for such varieties are given. In these trying times, when plants with economic value are becoming increasingly important, it seems only fitting that sources for such plants be published when available.

In this current issue of *Arnoldia* nursery sources for about forty of the sixty odd nut varieties discussed in the above-mentioned issue of *Arnoldia* are listed. Also, some one hundred other varieties are listed simply for the information of the prospective nut tree purchaser. For critical information concerning the relative merits of these varieties the reader is referred to *Arnoldia*, Vol. 1; 45-64; October 31, 1941.

It will be noted that only nine sources are listed for nut trees. This does not mean that no other nurseries offer nut trees. Far from it! Many a nursery dealing with ornamentals will have a few desirable varieties of nut trees available, but for the purposes of listing sources in this bulletin, it was advisable to refer only to those northern nurseries which grow nut trees as a specialty.

Although sources for about one hundred and fifty varieties have been found, only those starred have been recommended in the former issue of *Arnoldia* by Dr. L. H. MacDaniels. The others may or may not be of "good" quality. (Incidentally, Dr. MacDaniels did not mention persimmons.) However, this lengthy list of nut variety sources is here offered in the hope that it will materially assist home owners in acquiring a few nut trees for the home gardens. It shows that nut trees are available for spring planting in considerable variety and we hope we have done our part in specifically pointing this out to the plant buying public.

Northern Nurseries specializing in Nut Trees

1. Benton & Smith Nut Tree Nursery ; Wassaic, New York
2. Carroll Bush Nursery ; Eagle Creek, Oregon
3. Gellatly's Nut Nursery ; Box 19, Westbank, British Columbia, Canada
4. Indiana Nut Nursery ; Rockport, Indiana
5. J. F. Jones Nurseries ; Box 356, Lancaster, Pennsylvania
6. Nut Tree Nurseries ; Downingtown, Pennsylvania
7. Mountain Nut Company ; Roanoke, Virginia
8. E. A. Riehl Nursery ; Godfrey, Illinois
9. Sunny Ridge Nursery ; Swarthmore, Pennsylvania

Nut Tree Varieties and Their Sources

CHESTNUTS

American Chestnut (<i>Castanea dentata</i>)	Hobson 4, 7, 9
Hathaway 2	*Homan 2
Honey 2	*Reliable 7
	*Yankee 9
European Chestnut (<i>Castanea sativa</i>)	Zimmerman 9
Big Boy 2	
Quercy 2	Japanese Chestnut (<i>Castanea crenata</i>)
	Austin 4, 7, 9
Chinese Chestnut (<i>Castanea mollissima</i>)	Murden 7
*Abundance 2	Vibbert 7
*Carr 4, 7, 9	*Stoke (<i>mollissima</i> × <i>crenata</i>) 7

HAZELNUTS AND FILBERTS

Hazelnut and Filbert (<i>Corylus species</i>)	Giant) 2, 7
*Barcelona 2, 5, 6, 9	Holder 3
Bawden 3	*Italian Red 5
Brag 3	Jones Hybrid 5
Brixnut 7	Longfellow 2
Carey 3	Nixon 2
Clackamas 2	Nonpareil 2
Comet 3	Nooksack 2
Craig 3	Nottingham 2
Daviana 2, 5, 6	Scherf 2
DuChilly 2, 5, 6, 9	White Aveline 5, 6
Haller (Geantes de Halle, Hall's	Winkler 8, 9

* Variety recommended or discussed in *Arnoldia* Vol. 1, 45-64, by Dr. L. H. MacDaniels of Cornell University.

HICKORIES

Pecan (*Carya illinoensis*, *C. pecan*)

- Busseron 4, 5, 6, 9
- Gallatin 4
- Giles 4
- *Greenriver 4, 5, 6, 9
- Indiana 4, 5, 9
- Kentucky 9
- *Major 4, 9
- *Posey 4, 5, 6

Hicans (*C. laciniosa* × *C. illinoensis*)

- Bixby 4, 6, 9
- *Burlington 5, 9
- *Des Moines 9
- *Gerardi 9
- *McCallister 2, 4

Shagbark Hickory (*Carya ovata*)

- Anthony 1
- Brooks 8
- *Davis 1
- *Fox 1
- *Glover 1, 8

- *Goheen 1
- Hagen 1
- Hand 1
- Minnie 8
- Murdock 1
- *Neilson 8
- Romig 6
- Stanley 5
- Stratford 6, 9
- *Whitney 1
- *Wilcox 1

Hickory Hybrids

- Beaver (*C. cordiformis* × *C. ovata*) 8
- Berger (*C. tomentosa* × *C. laciniosa*) 1
- Creager (*C. cordiformis* × *C. ovata*) 8
- Fairbanks (*C. cordiformis* × *C. ovata*)
5, 6, 8, 9
- *Pleas (*C. cordiformis* × *C. illinoensis*)
5, 8
- Siers (*C. cordiformis* × *C. tomentosa*) 8
- Weiker (*C. ovata* × *C. laciniosa*) 8

WALNUTS

Black Walnut (*Juglans nigra*)

- *Allen 1
- Beck 8
- Benton 1
- Booth 1
- *Clark 1, 8
- *Cresco 1
- Edras 8
- Edmunds 8
- Hadley 8
- Hepler 8
- Impit 3
- *Kettler 8
- Korn 1
- Lamb Curly 4, 7
- Metcalf 8

- Mintle 1, 8
- Myers 1, 5, 6, 8
- Oakes 8
- *Ohio 1, 4, 5, 6, 8
- Pinecrest 1, 7
- Rohwer 8
- Sifford 1, 7, 8
- *Snyder 1, 8
- Sparrow 1, 8
- *Stabler 1, 4, 5, 6, 8, 9
- Stambaugh 1, 8
- Swartz 8
- *Tasterite 1, 7, 8, 9
- Ten Eyck 5, 8
- Thomas 1, 2, 4, 5, 6, 8, 9
- Thorp 1

Black Walnut (cont.)

Todd 1, 8
 Wanda 1, 8
 Weber 1
 Wetzel 1
 *Wiard 1
 William Penn 6

Persian (or English) Walnut

(*Juglans regia*)

Alpine 5
 Breslau 2
 Broadview 1, 7
 *Carpathian D. 1
 *Crath 1, 7
 Eureka 5
 Franquette 2, 7, 9
 Grenoble 5
 Hall 5
 King 2
 Mayette 5, 7, 9
 Payne 5, 7
 Pekin 2
 Sinclair 5
 Watt 3

Butternut (*Juglans cinerea*)

Buckley 8
 Creighton 8
 Herrick 8
 Johnson 8
 Lingle 8
 Sherwood 8
 *Thill 8
 *Van der Poppen 8
 Wright 6

Heartnut Hybrids (*Juglans sieboldiana cordiformis*)

*Bates 5
 Calender 3
 Canoka 3
 *Faust 8
 *Fodemaier 1
 Mackenzie 3
 O. K. 3
 *Walters 7, 8
 Wright 1

Buartnut (*Juglans cinerea* × *J. sieboldiana cordiformis*)

Crofter 3
 Leslie 3
 Okanda 3

Note: Though not considered nuts, there are a few varieties of persimmons that can well be included in this list of economically valued trees.

PERSIMMONS**American Persimmon (*Diospyros virginiana*)**

Buhrman 6
 Colby 4
 Early Golden 5, 6, 9
 Hicks 4
 Josephine 5
 Kansas 9
 Killen 9
 Lambert 5, 6
 Miller 4

Penland 4

Oriental Persimmon (*Diospyros kaki*)

Emperor 9
 Great Wall 9
 Honan Red 2
 Kawakami 2
 Lotus 2
 Peiping 9
 Sheng 2
 Tamopan 2

DONALD WYMAN

ARNOLDIA



A continuation of the BULLETIN OF POPULAR INFORMATION of the Arnold Arboretum, Harvard University

VOLUME 2

APRIL 10, 1942

NUMBERS 3-4

ASA GRAY AND HIS QUEST FOR *SHORTIA GALACIFOLIA*

THE word bewitched has antipodal meanings. The first, sinister, fearsome, savoring of Salem trials and clouded minds; the second charmed, enchanted, captivated. In this second sense Asa Gray was bewitched. For forty years, the greater part of his productive life, the memory of a fragmentary, dried, incomplete specimen in a neglected herbarium cabinet in France, haunted him. Child of his naming, the assurance of its existence as a living plant and the hope of its rediscovery were with him constantly. A shy, evergreen groundcover with dainty, creamy-white flowers in early spring; cheerful, shiny, bright green leaves in summer; a winter coloring rich and rare—it well deserved his lifelong devotion. When the search was ended and the visible assurance of its existence was placed in Gray's hands, he could well exclaim, as he did: "Now let me sing my *nunc dimittis*."

On November 9, 1838, Gray sailed in the packet ship Philadelphia for Europe. He had received appointment to a professorship in the newly planned University of Michigan at Ann Arbor. As the buildings were not ready he was granted a year's leave of absence, a salary of \$1500.00 and \$5000.00 was placed at his disposal to purchase books for the new University library. The main object of his trip, however, was to examine the original sources of American flora as they existed in the principal herbaria of Europe. After a twenty-one day voyage he landed in Liverpool and then began a year crowded with rich cultural and educational experiences. Everywhere he made friends among the botanists and scientists and everywhere he found in the old established herbaria specimens of American plants which had been collected through the past century by a long list of botanists and travellers.

Finding the herbarium specimen in France

By the middle of March Gray had reached Paris where he remained nearly a month. Here he worked over the collections of André Michaux (1746-1802), that indefatigable collector and botanist, who fifty years before had spent eleven years

in the United States, sending home to France great quantities of botanical treasures. Among these in a cabinet of unidentified plants was a faded, incomplete specimen with the label: "Hautes montagnes de Caroline. *An pyrola spec.? An genus novum?*" In his carefully kept Journal André Michaux not only tells of the finding of the plant, but gives careful directions that future botanists might also locate it in the "High Mountains of Carolina."

Michaux's Journal in French, as written, is not readily available, nor is there a translation of the whole Journal for English readers. Through the courtesy of Professor Edith Philips, of the French Department of Swarthmore College, the following translation of that small portion relating to the finding of *Shortia* is here presented. It will give some idea of the hardships borne by the botanist in his travels and covers his experiences on four disagreeable winter days when he came upon the little plant which has intrigued botanists for one hundred and fifty-four years.¹

The roads became more difficult as we approached the headwaters of the Keowee [spelled Kiwi by Michaux] on the 8th of December, 1788. . . . Two miles before arriving there I recognized the *Magnolia montana* which has been named *M. cordata* or *auriculata* by Bartram. There was in this place a little cabin inhabited by a family of Cherokee Indians. We stopped there to camp and I ran off to make some investigations. I gathered a new low woody plant with saw-toothed leaves creeping on the mountain at a short distance from the river. The weather changed and it rained all night. Although we were in the shelter of a great Strobilus pine our clothing and our covers were soaked. About the middle of the night I went to the cabin of the Indians, which could scarcely hold the family composed of eight persons, men and women. There were besides six big dogs who added to the filth of this apartment and to its inconveniences. The fire was placed in the middle without any opening in the top of the cabin to let the smoke out; there were plenty of holes, however, to let the rain through the roof of this house. An Indian came to take my place by the fire and offered me his bed which was a bear's skin. But finally the rain having stopped and annoyed by the dogs which kept biting each other continually to keep their place by the fire, I returned to the camp.

This place which is called the source of the Keowee is incorrectly so indicated. It is the junction of two other rivers or large torrents which unite at this place and which is known only as the forks of the Keowee.

On December 11 it froze hard and the air was clear and keen. I noticed a chain of high mountains which extended from west to east and where the frost was little felt in places exposed to the sun. I gathered a *Juniperus*

¹Michaux, F. A. Journal of André Michaux. 1787-1796, with an introduction and notes by Charles Sprague Sargent. Proc. Amer. Philos. Soc. 26: 1-145. 1889. The introductory part was read before the American Philosophical Society at its meeting on October 19, 1888. The translation here given was made from the printed text, p. 45-46. The priceless original journal has been removed to a place of safety for the "duration."

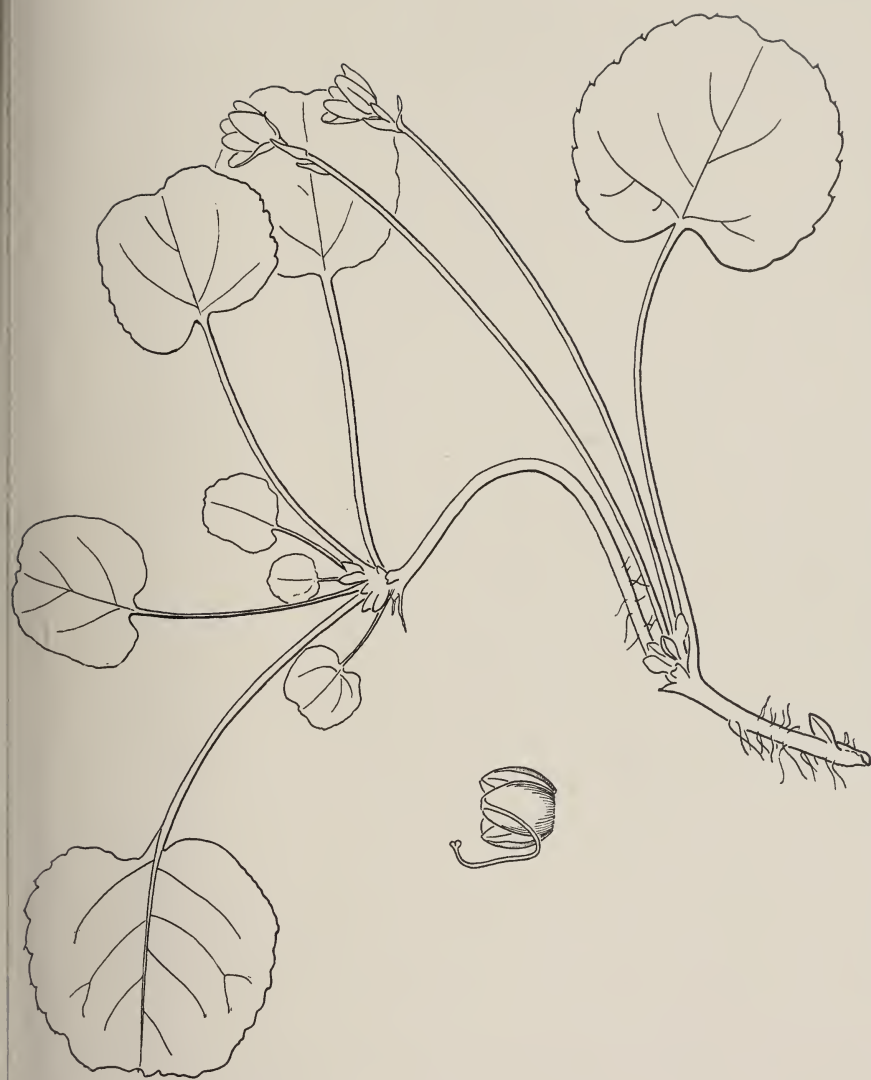


PLATE IV. *Shortia galacifolia*—from original drawing by Decaisne of the type specimen in the Michaux Herbarium, Paris, 1839. (Copied by G. Dillon, Feb., 1942.)

[*repens*] which I had not yet seen in the southern part of the United States but it must be noted that I saw on these mountains several trees of the northern regions such as *Betula nigra*, *Cornus alternifolia*, *Pinus Strobus*, *Abies*, Spruce, etc. We crossed a space of about three miles in the midst of *Rhododendron maximum*. I came back to camp with my guide at the head of the Keowee and gathered a large quantity of the low woody plants with the saw-toothed leaves that I found the day I arrived. I did not see it on any other mountain. The Indians of the place told me that the leaves had a good taste when chewed and the odor was agreeable when they were crushed, which I found to be the case.

Directions for finding this plant

The head of the Keowee is the junction of two torrents of considerable size which flow in cascades from the high mountains. This junction takes place in a small plain where there was once a Cherokee village. On descending from the junction of these two torrents with the river to one's left and the mountains which face north on the right, one finds at about 200-300 feet from the junction, a path formed by the Indian hunters.¹ It leads to a brook where one recognizes the site of an Indian village by the peach trees which still exist in the midst of the underbrush. Continuing on this path one soon reaches the mountains and one finds this plant which covers the ground along with the *Epigaea repens*.

In his journal for April 8, 1839, Gray records the find in the herbarium of the Paris Museum which immediately aroused his interest:

"But I have something better than all this to tell you. I have discovered a new genus in Michaux's herbarium—at the end, among *plantae ignotae*. It is from that great unknown region, the high mountains of North Carolina. We have the fruit, with the persistent calyx and style, but no flowers, and a guess that I made about its affinities has been amply borne out on examination by Decaisne and myself. It is allied to *Galax*, but is 'un très distinct genus,' having axillary one-flowered scapes (the flower large and a style that of a *Pyrola*, long and declined). Indeed I hope it will settle the riddle about the family of *Galax*, and prove Richard to be right when he says *Ordo Ericarum*. I claim the right of a discoverer to affix the name. So I say, as this is a good North American genus and comes from near Kentucky, it shall be christened *Shortia*, to which we will stand as godfathers. So *Shortia galacifolia*, Torr. and Gr., it shall be. I beg you to inform Dr. Short, and to say that we will lay upon him no greater penalty than this necessary thing—that he make a pilgrimage to the mountains of Carolina this coming summer and procure the flowers."

Charles Wilkins Short (1794-1863) and Asa Gray never met. Their friendship was founded on a voluminous correspondence and a mutual respect for the botan-

¹Sargent notes, "This path still exists very much in the same condition, probably, as Michaux found it a hundred years ago." Proc. Am. Philos. Soc. 26: 47. 1889.

ical writings and attainments of each other. Both had been graduated in medicine and both were college instructors in science. Short was Gray's senior by sixteen years. He never saw the dainty little plant so honorably named, nor the dried specimen in the Paris herbarium. This and the few lines in Torrey and Gray's Flora of North America were all that were definitely known of it until fourteen years after Dr. Short's death. Apparently the latter never made the penalty pilgrimage to the mountains of Carolina in search of his namesake. His own large collection of dried plants passed to the Academy of Natural Sciences in Philadelphia but his name is still to be found on the twenty-five thousand herbarium specimens he is said to have generously distributed to like-minded enthusiasts throughout the world.

The search of the Carolina mountains

Returning from his trip abroad, Gray reached home early in November, 1839, and immediately plunged into the task of completing the Flora of North America. *Shortia*, however, was always in his mind. It was Michaux's incomplete and misleading label "Hautes montagnes de Caroline" on the herbarium specimen in Paris that delayed for nearly forty years the satisfaction he was to have in holding in his hand a living plant. In anticipation of a botanizing trip Dr. Gray now consulted Michaux's journal. But one must read carefully to find the reference, although in all the journal no species location is so faithfully described as in that of *Shortia*, but Gray unfortunately missed the significance of Michaux's directions, or did not realize that the passage reproduced above appertained to the much desired *Shortia*. With two friends, John Carey and James Constable, he started on his first quest late in June, 1841. To the "High Mountains" they went, Roan, Iron, Grandfather, Black and others, all over 5000 feet in height. Michaux had also visited them. He recorded in his journal that on the 30th of August, 1794, standing on the summit of Grandfather, which he thought was the highest peak in all the Appalachians, he and his guide, John Davenport, had chanted the Marseillaise and cried "Vive l'Amérique et la République Française, Vive la Liberté!"

The Gray exploring party made its headquarters in the little town of Jefferson, the County seat of Ashe County, North Carolina. None of the party knew that *Shortia* flowered in late March or early April, nor did they know at what altitude it grew. Reporting on his extended trip in a classical account which he wrote for Sir William J. Hooker, Gray says: "We were unsuccessful in our search for a remarkable undescribed plant with a habit of *Pyrola* and the foliage of *Galax*, which was obtained in the high mountains of Carolina. The only specimen extant is among the 'Plantae incognitae' of the Michauxian herbarium, in fruit only; and we were anxious to obtain flowering specimens, that we might complete its history; as I have long wished to dedicate the plant to Professor Short, of Kentucky, whose attainments and eminent services to North American botany are well known and appreciated both at home and abroad."¹ In a footnote from this quoted passage is the first published description of the genus *Shortia* Torrey and Gray.

Two years passed and the position at Michigan having been abandoned, on April 30, 1842, Gray was appointed to the Fisher Professorship of Natural History in Harvard College. Again *Shortia* called him and for nearly three months in 1843, this time with another friend, William S. Sullivant, he herborized in the same general territory, the happy hunting ground of many distinguished botanists, both before and since. But again he was searching in the wrong place and again was disappointed. In neither trip did he come within many miles of where the little plant had been first discovered.²

Dr. John Torrey was the first to suggest as early as 1852, that *Shortia* was probably an early spring plant and further that it might disappear after flowering and perfecting its seed. "One should be pretty early on the ground to find it in flower," he wrote Dr. Short who was anticipating a journey to the Carolina mountains in quest of it. John Carey about the same time was urging Dr. Short to ascertain the name and whereabouts of Michaux's old guide, John Davenport, from whom he might learn his track "in general if not in particular."³

Rediscovery at last!

It was in May, 1877, that seventeen year old George McQueen Hyams (1861-1932) of Statesville, N. C., found *Shortia* growing on the banks of the Catawba River near Marion, the county seat of McDowell County, N. C.,⁴ some seventy miles in a direct line from the site of Michaux's discovery. His father, M. E. Hyams (1819-1891), was an herbalist but did not know the plant and eighteen months later sent a specimen for identification to a friend, Joseph W. Congdon of East Greenwich, R. I. He in turn wrote Dr. Gray telling him he thought he had *Shortia*. The latter wrote "send it on" and at last the search of nearly forty years was at an end. Dr. Gray was triumphant. "No other botanist has the news," he hastened to write, on October 21, 1878, to his close friend and fellow botanist William M. Canby, who was to be the first to share with him the jubila-

¹See **Gray, A.** Notes of a botanical excursion to the mountains of North Carolina, etc. with some remarks on the botany of the higher Alleghany Mountains, in a letter to Sir Wm. J. Hooker. *Am. Jour. Sci.* **42**: 1-49. 1842, also published in *London Jour. Bot.* **1**: 1-14, 217-237. 1842, **2**: 113-125. 1843, **3**: 230-242. 1844; reprinted in *Scientific papers of Asa Gray*, selected by Charles S. Sargent **2**: 22-70. 1889.

²For an account of the second journey see **Gray, A.** Musci Alleghaniensis, sive Spicilegia Muscorum atque Hepaticarum quos in itinere a Marylandia ad Georgiam per tractus montium A. D. MDCCCXLIII, decerpserunt Asa Gray et W. S. Sullivant. . . *Am. Jour. Sci.* II **1**: 70-81. 1846 (p. 79-81).

³Letter from John Carey to C. W. Short edited by Prof. W. C. Coker. *Jour. Elisha Mitchell Sci. Soc.* **57**: 122. 1941.

⁴F. M. Crayton for fifty years a well known plantsman and collector of Biltmore, N. C., says all the stations of *Shortia* in McDowell County, where it was rediscovered in 1877, have been destroyed with the exception of one small colony. He has found it in nearby Burke County where it has increased considerably in the last twenty-five years.



PLATE V. Composite drawing made in 1940 from a portrait of Asa Gray made in about 1843. The microscope shown is the one he used. (Courtesy of the First National Bank of Boston.)

tion over the rediscovery. In the period of forty years of waiting, many deserved honors had come to him, including college degrees and memberships in fifty learned and cultural societies throughout the world. A few months previously he had been elected a member of the Academie des Sciences of the Institut de France, one of the most coveted rewards to a scientific man. Yet the discovery he was communicating to his friend, "has given me," he said, "a hundred times the satisfaction that the election to the Institut did." And then he continues: "If you will come here I can show you what will delight your eyes and cure you effectively of the skeptical spirit you used to have about *Shortia galacifolia*. It is before me with corolla and all from North Carolina! Think of that! My long faith rewarded at last."

Dr. Gray wrote to M. E. Hyams,¹ October 27, 1878, telling him how much immortality had been lost for his son by not sending the specimen when it was found eighteen months before, in order that the description might have been included in the edition of the Flora which had gone to press in the meantime, but promising to make his name famous through an article in "Silliman's Journal pro tem." He also informed M. E. Hyams, that he or Mr. Canby, or both, would be down the following May, call for the boy and ask to be taken to the spot. Mr. Hyams in replying, October 31, tells of the finding of the plants: "We were passing along the road and my attention was called to an elevated hillside that I could not ascend as being at the time rather exhausted, being sixty years old, requested him [his son] to ascend and bring whatever was in flower. I have forgotten the locality, but he is fully known to it, as he lived within two miles of the place for several years."²

Now that a definite station for *Shortia* had been located, Dr. Gray early in the spring of 1879 organized a real excursion to see it growing in the wild. Mrs. Gray and her brother with the latter's wife and their two daughters and his botanical friends, William M. Canby of Wilmington, Del., Dr. Charles S. Sargent of Brookline, Mass., and J. H. Redfield of Philadelphia, Penna., composed the party. The four principals of the party arrived in Statesville, N.C. by train and were entertained by a Mr. Wallace, a leading citizen of the town. Redfield wrote a full account of the trip but only that portion relating to *Shortia* is included here. He says:³ "The recent rediscovery of *Shortia* in North Carolina has created much

¹The interest of M. E. Hyams in botany was lifelong and enthusiastic. A son relates that when he would take his boys walking he would bid one look up and the other look down so they would miss nothing. He was a purchasing agent and collector of medicinal plants for a large Baltimore drug house. His home was in Statesville, N.C. from 1870 until his death in 1891. The botanical fame which Dr. Gray promised George M. Hyams as the rediscoverer of *Shortia* did not materialize. Removed from the influence of his father he lost interest in botany and became the proprietor of a general store and postmaster at Old Fort, N.C. where he was a respected and influential citizen. He died at Old Fort in 1932.

²Original letter in Gray Herbarium.

³**Redfield, J. H.** Notes of a botanical excursion into North Carolina. Bull. Torrey Bot. Club. 6: 331-339. 1879.

interest among botanists. . . . Searches repeated in the course of many years had proved fruitless, so that to the botanical fraternity and particularly to the author of the genus the recovery was somewhat like that of a long lost child. . . . The object was not only to see *Shortia* but to find more of it if possible and to explore some portions of the mountains which the oldest member of the party [Dr. Gray] had visited in 1841 and 1843. . . .

"A visit to the root and herb warehouse belonging to Wallace Brothers and under the charge of Mr. Hyams, furnished evidence that this branch of industry has reached an extent and importance of which few are aware. The printed catalogue of indigenous plants, dealt in by this house, enumerates about 630 species. . . . These simples find a large market, both in this country and Europe, and the orders come mainly from the wholesale druggists and the manufacturers of patent medicines. Think of a single order for fifteen tons of *Hepatica triloba*! . .

"Being now in McDowell County, the *Shortia* locality was visited under the guidance of Mr. George M. Hyams the actual discoverer. In the secluded and well protected station, well over-shadowed by Rhododendrons and Magnolias, was seen the little colony of the plant, so long sought and by many so long doubted. Its companions were *Mitchella repens*, *Asarum Virginicum* and *Galax aphylla*. The space over which the plant extended was perhaps 10 feet \times 30 and in all there may have been 50 to 100 plants. As the plant multiplies by stolons it is remarkable that its area should be thus restricted and since in the struggle for life of two allied plants the weaker 'must go,' Dr. Gray suggested the possibility that its stronger cousin, the *Galax*, had crowded out the *Shortia*. And here indeed, in what may be the last foothold of the rarity, *Galax* appeared to be actually doing so. Yet the plants, though comparatively few, were vigorous and healthy. Other stations may be looked for; but they must be hard to find. When we consider the long search which has been made for this plant, how all the mountain region of the Carolinas and Tennessee has been examined by the sharp optics of Buckley, Rugel, M. A. Curtis, Dr. Gray, Canby, Le Roy and Ruger, the Vaseys, elder and younger, Chickering and others, it is very certain that if there be other localities they must be 'few and far between.' "¹

Asa Gray never saw *Shortia in bloom* in its native mountains, nor did he ever visit the forks of the Keowee. Shortly after his return to Cambridge he wrote to Dr. Short's daughter:

Botanic Garden, Cambridge, Mass.

Aug. 5, 1879

Hon. and dear Madam:

I respond at once to your letter of Aug. 1st, and send you the announcement in Silliman's Journal, on which (& on a later) notice the article in the "Garden" must have been founded.

¹See also Gray's account of the rediscovery of *Shortia*. Gray, A. *Shortia galacifolia* rediscovered. Am. Jour. Sci. III. 16: 483-485. 1878.

Year after year have I hunted for that plant! And I grew sorrowful at having named after Dr. Short a plant that nobody could find. So conspicuous for its absence had this rarity become, that friends of ours botanizing in the mountains two years ago, were accosted with the question—"Found *Shortia* yet?"—from people who had seen our anxious search for it. After all, the rediscovery was accidental, and by one not a botanist. Few botanical events excited more interest at home and abroad; and your honored father is commemorated by perhaps the most interesting flower in N. America, with a counterpart in Japan.

Well my wife and I with three other botanists, passed the month of June 1 in a visit to the discovered locality—a small patch, at the foot of the mountains, and in a diligent search for more—as it no doubt belongs higher up in the mountains. *We did not find more of it.* But I am not yet 69 years old, and I hope to try once more, having now narrowed the region in which the search should be made with some confidence.

But we had a delightful journey. When your memorial is printed please let me have a copy of it. Consider I have an interest in the subject of it next to his descendants.

Excuse hurried line from a very busy man, & poor writer, and believe me to be always,

Yours very sincerely,
Asa Gray

(P.S.) I have had more or less to do with the naming (besides the genus) of several species for Dr. Short. Among them *Carex Shortii*, *Viscaria Shortii* [now *Lesquerella globosa* in Gray 7th ed.], *Aster Shortii*, *Solidago Shortii*.

A.G.

(P.S.) The flowering specimens are left in the hands of Mr. Hyams who is a plant dealer—Statesville, N. C. They have been gathered scantily not to endanger the stock. Next year you shall have a dried specimen, or better a plant to flower for yourself. A pretty but modest thing.

A.G.¹

Dr. Sargent finds *Shortia*

Dr. Sargent was not satisfied with the meagre results of the search for *Shortia* in 1879 and again visited the Carolinas in the early autumn of 1886 hunting for *Magnolia cordata*, mentioned by Michaux. At Sapphire, Transylvania County, N.C., he and Mr. Stiles who accompanied him, were met by Frank E. Boynton of Highlands. One evening after a botanizing trip Dr. Sargent produced a leaf and asked what it was. Mr. Boynton thought it might be *Galax* but examining it more closely said he did not know. Mr. Stiles jokingly said: "That is *Shortia*," and it turned out so to be. It was a coincidence that in the evening mail the following letter arrived from Dr. Gray:

¹Letter in a collection of Dr. Short's letters at the University of North Carolina. Published in the Jour. Elisha Mitchell Sci. Soc. 57: 167. 1941.



C. W. Short

PLATE VI. Copied from an engraving of Dr. Charles Wilkins Short owned by the American Philosophical Society; there is also a copy of this in the Jane Loring Gray collection of portraits of botanists at the Gray Herbarium.

September 17, 1886.

My dear Sargent:

Would I were with you. I can only say crown yourself with glory by discovering a habitat—the original habitat of *Shortia* which we will believe Michaux found near where *Magnolia cordata* came from in that first expedition.

Yours, ever,
Asa Gray

Unfortunately Dr. Sargent could not recall where he had found the *Shortia* leaf. He and his party had travelled all day over rough mountain country searching for *Magnolia cordata*. So the two Boynton brothers were sent back to locate the growing plants from which the leaf had been plucked. Frank Boynton remembered that Dr. Sargent and he had passed through Bear Camp, a small settlement on Bear Camp Creek, a little stream flowing into the Horse Pasture River, which in turn enters the Keowee. Here they found *Shortia* and gathered a small amount and it was one of these living plants which Dr. Sargent placed in Dr. Gray's hands as coming from the Michaux land "the headwaters of the Keowee," for it was at this place that Michaux first found it on December 8, 1788.

Two reports from Frank E. Boynton¹ associated with Dr. Sargent in his botanical excursion in search of *Shortia* and *Magnolia cordata*, aroused the enthusiasms of botanists two generations ago. Mr. Boynton's home was in Highlands, N.C. near the South Carolina line, which town boasts of being the highest incorporated town east of the Mississippi River. The following is a quotation from his letter to Professor Sargent, November 7, 1886.

"Several days ago I went to Cashiers Valley to get seed of the *Rhododendron Vaseyi* for you. After getting it I could not withstand the temptation to go down through the country and look up *Shortia*. I made a sort of calculation as to the direction in which the forks of the Toxaway and Horse Pasture were from me, and started on through the woods. I went through some rough country and finally came to a little settlement called Bear Camp way down in a deep cove. Here I found *Ilex mollis*. . . . A small stream called Bear Camp Creek runs through the little valley. I followed the br. down from several miles and finally came to a bank with *Shortia*. There was rods covered with it just as *Galax* covers places about here."

Frank E. Boynton accompanied by his brother Charles L. Boynton made a trip in the spring of 1889, from their home in Highlands, N.C., to the headwaters of the Keowee. The account will aid other botanists who may wish to ascertain if *Shortia* still grows in the great profusion and in the location described. He writes:²

¹From Boynton's original letter in the Gray Herbarium, Cambridge, as Dr. Sargent sent Boynton's letter to Asa Gray.

²**Boynton, F. E.** The home of *Shortia*. Gard. & Forest 2: 214-215. 1889. Frank E. Boynton is still living, in poor health, at Old Fort, N.C. His brother Charles L. Boynton is living in Lodi, California.

“We camped the first night at the White Water Falls, which alone are worth a considerable journey to see. The Jocassee Valley, our destination, is at the mouth of White Water Creek or rather at the Junction of White Water and Devil Fork. I wished to see if *Shortia* was growing as high up in the mountains as these Falls, which are at least 1000 feet above Jocassee. No *Shortia* was found, however, until we reached the valley, which has an altitude of about 1200 feet and here it grows by the acre. Every little brooklet is lined with it. Most of these little water courses are in deep narrow gorges where the sun hardly penetrates, except during the middle of the day. All these steep banks are literally covered with *Shortia*. What is comforting to the botanist is that it can hardly be exterminated. It is on land too steep to be cultivated and there is such an abundance that no amount of collecting can ever effect it strenuously. Our party took away bushels of it, and no one could tell that a plant had been disturbed, so thickly it is growing. No idea of the beauty of this plant can be formed until it has been seen in its native home. The mass of glossy green and white, once seen, can never be forgotten.

“The home of *Shortia* is a strange mixture of North and South. As a rule it grows under the shade of rhododendrons and tall kalmias. Hemlock and white pine of splendid dimensions are very common. . . . To see *Shortia* in blossom and in its glory one must get there about the 20th of March, not later than March 25.”

Another later botanist, Professor Henry J. Oosting, of Duke University, tells of herborizing in 1936 in another nearby region. He says, “the *Shortia* in Toxaway Gorge is scattered along the low banks of a stream for perhaps a half mile, as I recall. It grows in dense mats two to six feet in diameter. The locality is rather inaccessible for, as the guide remarked, ‘it’s five miles down into the gorge and fifteen miles out.’ I saw it in the rain and got no satisfactory pictures.”

Recent searches for the plant

An examination of specimens in thirty one of the leading herbaria in the United States discloses ninety-eight sheets of *Shortia*. Of these forty-four were collected along the banks of the Whitewater River in Oconee County, S.C. Fourteen more are listed as coming from the Jocassee Valley, also in Oconee County. Thirteen were found in McDowell County, N. C. more definite locations not being given. Eight were found in the Toxaway Gorge in Transylvania County, N. C., three along the Bear Camp Creek and two along the Horse Pasture River, both locations in Transylvania County. One each from “the mountains of N. W. Carolina,” “4 miles N.W. Salem, S.C.” and “Macon Co., N.C.” The remainder are specimens with labels giving no definite locality or come from cultivated plants. The Biltmore herbarium was very generous in distributing specimens, a number of sheets bearing their imprint.

The Savannah River and its tributary, the Tugaloo, form the boundary between South Carolina and Georgia. The Tugaloo and the Seneca form the Savannah. The Seneca is made by the Little River and the Keowee and the latter in turn is

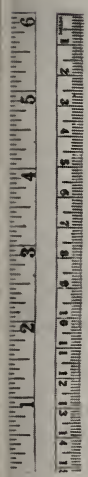
formed by the Whitewater and the Toxaway. The junction of these two latter streams lies in Oconee, the northwesternmost county of South Carolina where this state joins Georgia and North Carolina. The rocky gorges of these tumbling streams are the native haunts of the little plant with the serrate leaves and is the wilderness first botanically explored by the intrepid Michaux.

The North and South Carolina state line runs directly through the *Shortia* hiding places and it is doubtful whether the early botanists knew in which state they were collecting. All the known *Shortia* land is now included in two great national forests. The Natchala National Forest embraces the five western counties of North Carolina and includes in its limits the Joyce Kilmer Memorial Park. The Sumter National Forest, which immediately adjoins it on the south within the State of South Carolina, embraces a large part of Oconee County.

In 1940-1 the Forest authorities, as reported by Mr. Ralph M. Nelson, Acting Director, made a search for colonies of *Shortia* on national forest land. They reported "no colonies were found." Whether foresters are the best searchers for a shy, little ground cover, is a question for they have been trained to follow Edward Everett Hales' injunction "look up and not down." But much of the area within the limits of the forests has not yet been acquired by the Government and *Shortia* colonies may occur on privately owned land where the rangers did not search. It is incredible that a species that may have occurred in "acres and acres" which has been searched by keen-eyed botanists and collectors has been entirely exterminated. To the casual observer, except when they are in bloom, *Shortia* resembles *Galax* and it is difficult to distinguish from it. Undoubtedly *Shortia* can still be found in abundance in many an unfrequented gorge along the tributaries of the Keowee.

Growing *Shortia* in the North

Shortia plants may be obtained from a number of nurserymen and collectors who specialize in the flora of the Carolina mountains. An authority writing for Bailey's Encyclopedia of Horticulture, says that it fails to set seed as the stem withers before the seed matures. Apparently no plants are propagated in this way. It would be well for botanists and growers to note whether this condition generally prevails. *Shortia* was grown successfully in the Arnold Arboretum without special care for twenty-five years (it has recently disappeared, however, but is now being re-established) and may be found in many wild gardens throughout the country. It is hardy up to the White Mountains of New Hampshire where the thermometer goes forty degrees below zero. It has been successfully grown for fifteen years on the estate of F. Cleveland Morgan some twenty miles northwest of Montreal, Canada, and has been reported as cultivated at Grand Metis, on the Gaspé Peninsula, one hundred and fifty miles further north than Montreal. There are numerous reports of failure, however, as it often lives for a while and then pines away and disappears. These failures are probably due to the soil and location and not the climate.



May. 1877. from Hyams



Drawn by I. Sprague from the flower
(of *Shortia* from received from Hyams)



Nat. Order—*Ericaceae*
Bot. Name—*Shortia Galatoides* T. & G.
Common Name—Hyams' sparkling Shortia
Locality—McDowell County North Carolina, U. S. A.
Collector and Discoverer—M. J. Hyams.
State—North Carolina, U. S. A.
Date—April 11/77

SYN. FL. N. AMER.

PLATE VII. The Hyams *Shortia* specimens in the Gray Herbarium. The detailed drawing is by Isaac Sprague.

It has been growing at the Hemlock Arboretum in Philadelphia for several years. A six inch bed of oak leaf mold was prepared, under and near a clump of hemlocks, where it gets the sun but an hour or two in the middle of the day. One clump, however, planted under a dense, low-growing dogwood, where it had no sun at all, did better than its fellows. In the autumn the oak leaves, as they fall, nestle down and cover the bed. In the spring these are removed and sieved leaf mold is scattered over the clumps and worked down under the leaves. Again in the summer a light application of peat moss is given in the same way.

Dr. Frederick P. Lord of Hanover, N.H. thinks his success in growing *Shortia* is due to applications of a mixture of cottonseed meal, superphosphate and potassium sulphate, but after disastrous experiences trying to help *Epigaea repens* along, we, at the Hemlock Arboretum, having been afraid to use commercial fertilizer of any kind for ericaceous plants. Dr. Lord also waters his stands rather regularly during the summer but here again we are afraid to use the city water, with its supercharge of bacteria-destroying chemicals. Our plants could not do better if growing in their pristine mountain homes, as they have a healthy leafage and an abundance of flowers. Observations of two successful plantings show that in these *Shortia* does better on a slope than when grown on level ground. This may be due to better drainage or less direct exposure to the sun.

On the herbarium specimens which the Hyams prepared and distributed extensively in 1878, "Hyams' Sparkling *Shortia*" was given its common name, but this was extremely local in its use. Alice Lounsberry in her book "Southern Wild Flowers and Trees," (1901) says "*Shortia*'s common name was Little Colt's Foot," a dainty and descriptive designation. In 1923, the editors of Standardized Plant Names, called it Oconee Bells and this now is the name generally used in the nursery trade. The significance, of course, is it having been first found in the wilderness of what is now Oconee County, S.C.

As has been stated up to the time of the rediscovery of *Shortia* Dr. Gray had received fifty honorary degrees and memberships in learned societies. Twenty-one more were to come to him before his death, which occurred January 30, 1888. He was buried in Mount Auburn Cemetery, Cambridge, Mass., where a simple stone bearing a cross marks his last resting place. It may not be too late to suggest that, with the soil properly prepared, there might be planted on his grave an ever green and ever beautiful blanket of the little flower which he so loved and which he pronounced "perhaps the most interesting plant in North America."

CHARLES F. JENKINS
Hemlock Arboretum
Mt. Airy, Philadelphia, Pa.

ARNOLDIA



A continuation of the BULLETIN OF POPULAR INFORMATION of the Arnold Arboretum, Harvard University

VOLUME 2

APRIL 17, 1942

NUMBER 5

THE Highbush BLUEBERRY

THIS spring many a gardener in the eastern and northeastern United States will contemplate planting a few economically important woody plants. In a recent issue of "Arnoldia" various nut trees were discussed and in Volume 2, No. 2, March 13, 1942, nursery sources for 146 varieties of nut trees were given. In this issue, attention is called to the blueberries, especially the horticultural varieties of the highbush blueberry, *Vaccinium corymbosum*. The highbush blueberry is found in swamps or moist areas, and also grows at high elevations. It may grow from ten to fifteen feet tall and does not stand drought very well. In certain areas of the eastern part of the United States an increasing amount of interest is being shown in the comparatively "new" horticultural varieties of this species, as is evidenced by large commercial plantings. These same varieties are also becoming more popular among home owners who have a limited amount of land available.

Blueberries are native over a wide area in the eastern and northeastern United States, as well as in northern Wisconsin, Michigan and Minnesota. Several species are valued for their fruits, and these are gathered over large areas where the plants are native. In 1941 the value of the crop picked in only three states where blueberries are grown (New Jersey, North Carolina and Michigan) amounted to \$700,000. It has been chiefly with *V. corymbosum* that the greatest amount of selection and hybridization has been done, and through hybridization the sizes of the individual berries have actually been tripled so that now varieties of the highbush blueberry can be obtained with fruits nearly an inch in diameter. It is these large fruited varieties which are proving so popular today. By planting the right variety at the start and by intelligent pruning and culture, several varieties of *V. corymbosum* can be depended upon to produce unusually large and delicious fruits.

The pioneer in blueberry investigations was the late Dr. F. C. Coville of the U. S. Department of Agriculture who, as early as 1906, began his experiments

in selection and hybridization. Miss Elizabeth White of Whitesbog, New Jersey, cooperated with him closely for a number of years and assisted him in many problems. She was also responsible for selecting a number of promising plants from the wild, and grew thousands of seedlings for close study. Dr. Coville has reported growing 68,000 seedling blueberries to bearing age from which to make his selections. Of this large number only fifteen were considered sufficiently worth while to name and introduce into the trade. In these tests over 300 seedlings bearing fruits over $\frac{3}{4}$ " in diameter were discarded merely because they did not meet the rigid standards of flavor set by Dr. Coville. Of the eighteen varieties offered by eastern growers in 1942, it is interesting to note that Dr. Coville was responsible for either selecting or originating fourteen of them. Some varieties like the Wareham, Scammell and Rancocas originated as far back as 1915, while others like the Dixi originated in 1930 and even as late as 1937 there was only one plant of this variety, but it is now offered by at least two nurseries. It takes a number of years to grow a blueberry bush from seed to sufficient size so that its productiveness can be adequately tested, this being one of the reasons why blueberry culture is only beginning to come into its own. With eighteen varieties of the highbush blueberry now available, potential growers should have an adequate list from which to select.

Size of the individual fruit is not all-important when judging the qualifications of a new blueberry. Time of maturity, color, keeping qualities, taste, hardness, and even the shape of the bush are all qualities to be carefully considered when making selections for the home garden. The U. S. Department of Agriculture Leaflet No. 201 lists twelve of the outstanding varieties in the order of importance in which they measure up to each one of these essential characteristics, and this table is reproduced herewith:

Blueberry varieties ranked approximately in order of importance with reference to certain characteristics of ripening, size of berry, and dessert quality

Rank	Season (early to late)	Size of berry (large to small)	Dessert qual- ity (good to poorer)	Color (light to dark blue)	Shipping quality (good to poorer) ¹	Cold resist- ance (hardy to tenderer) ¹	Bush shape (erect to spreading)
1	Weymouth	Dixi	Stanley	Stanley	Jersey	Wareham	Rubel
2	June	Weymouth	Wareham	Jersey	Rancocas	Jersey	June
3	Cabot	Jersey	Pioneer	Concord	Rubel	Stanley	Concord
4	Rancocas	Wareham	Dixi	Pioneer	Scammell	Concord	Scammell
5	Pioneer ²	Stanley	Scammell	Rubel	Pioneer	Rubel	Weymouth
6	Concord	Concord	Concord	Dixi	June	June	Wareham
7	Scammell ³	Scammell	Rancocas	Rancocas	Stanley	Rancocas	Rancocas
8	Stanley	June	Cabot	Cabot	Wareham	Scammell	Dixi
9	Dixi	Rancocas	Weymouth	Weymouth	Cabot	Cabot	Jersey
10	Rubel	Cabot	Rubel	Scammell	Concord	Pioneer	Stanley
11	Jersey	Pioneer	Jersey	June			Pioneer
12	Wareham	Rubel	June	Wareham			Cabot

¹ The Dixi and Weymouth are too new for their shipping quality and cold resistance to be estimated accurately.

² Pioneer in Michigan ripens with or later than Stanley.

³ Scammell ripens later than Stanley in New Jersey.

Many fruit trees and bush fruits can be expected to bear well, providing they are planted in a "good garden soil." This is not necessarily so with the highbush blueberry. If the "good garden soil" is on the alkaline side, the blueberry bushes will soon sicken and die for these plants are adapted to acid soils only. The average gardener should be cautioned against going into blueberry culture without thoroughly investigating all the growth requirements necessary to insure strong healthy plants. Some soils are ideally suited for blueberries, other soils are not, and a knowledge of such requirements at the start will save disappointments later.

Blueberry culture has been thoroughly discussed in various publications of the different state experiment stations especially in those states where blueberries grow in abundance. At the end of this bulletin is a list of the more recent and complete experiment station bulletins. These are available to the home owners within the state concerned, and are usually available free or for a small charge to individuals outside the state. One or more of these bulletins should be obtained by every person contemplating growing blueberry bushes, for all the essentials of planting, pruning, fertilizing, pest control and other factors are carefully and clearly discussed.

Northern growers selling horticultural varieties of *Vaccinium corymbosum*

1. Atwater Nurseries; 368 South Street, Agawam, Massachusetts.
2. Theodore H. Budd; Pemberton, New Jersey.
3. Byrd's Nursery; Lacota, Michigan.
4. Houston Orchards; Hanover, Massachusetts.
5. Dr. Keefe's Blueberry Plantations, Inc.; Grand Junction, Michigan.
6. Mrs. Mabelle H. Kelley; East Wareham, Massachusetts.
7. George A. Morse; Williamson, New York.
8. J. H. Putnam; Franklin County Nursery, 189 Silver Street, Greenfield, Massachusetts.
9. Rayner Brothers; Salisbury, Maryland.
10. H. B. Scammell; Toms River, New Jersey.
11. J. R. Spelman Company; South Haven, Michigan.
12. Joseph J. White, Inc.; Whitesbog, New Jersey.
13. H. L. Willis; 654 Forest Avenue, East Lansing, Michigan.

**Plants of horticultural varieties of *Vaccinium corymbosum*
offered by growers in 1942**

Adams—5, 11
Atlantic—2, 12, 13
Burlington—12
Cabot—1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Concord—1, 2, 4, 5, 7, 8, 10, 11, 12, 13
Dixi—12, 13
Grover—8
Harding—5, 11
Jersey—1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
June—2, 5, 9, 11, 12
Pemberton—2, 12, 13
Pioneer—1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Rancocas—1, 2, 3, 4, 5, 7, 9, 10, 11, 12, 13
Rubel—1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Scammell—2, 8, 9, 10
Stanley—2, 6, 8, 9, 11, 12
Wareham—4, 6, 13
Weymouth—2, 10, 12

Good References for Information on Blueberry Culture

(Each state experiment station usually supplies its bulletin free to residents within that state and makes a small charge for its bulletins to residents in other states. The U.S.D.A. bulletins are supplied for a very small charge.)

1. Coville, F. V. Direction for Blueberry Culture, 1921. U. S. Dept. Agr. Bull. 974. October, 1921. Washington, D.C.
2. Beckwith, C. S., Coville, S. & Doehlert, C. A. Blueberry Culture. N.J. Agr. Exp. Sta. Circ. 229. April, 1937. New Brunswick, N. J.
3. Latimer, L. P. & Smith, W. W. Improved Blueberries. Univ. of N. H. Ext. Serv. Ext. Circ. 215. June, 1938. Durham, N. H.
4. Slate, G. L. & Collison, R. C. The Blueberry in New York. N.Y. State Agr. Exp. Sta. Circ. 189. March, 1940. Geneva, N.Y.
5. Darrow, George M. Blueberries. U. S. Dept. Agr. Leaf. 201. October, 1940. Washington, D.C. (\$0.05)
6. Darrow, George M. The Atlantic, Pemberton and Burlington Blueberries. U. S. Dept. Agr. Circ. 589. December, 1940. Washington, D.C. (\$0.05)
7. Bailey, J. S., Franklin, H. J. & Kelley, J. L. Blueberry Culture in Massachusetts. Mass. Agr. Exp. Sta. Bull. 358. April, 1941. Amherst, Mass.

For a short history of Dr. Coville's interesting experiments in blueberry hybridization and a discussion of how certain varieties originated see Coville, F. C. Improving the Wild Blueberry. Yearbook, U.S. Dept. Agriculture, 1937. 559-574.

DONALD WYMAN

ARNOLDIA



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THE ONE HUNDRED "BEST" LILACS

OVER five hundred different lilacs are actually being grown in North America today, approximately three hundred of which are being offered by the nursery industry. Truly a bewildering number, especially for the average home owner who wants only a few of "the best" for his own small garden. However, this very large number contains many varieties which are now termed "obsolete," being surpassed by newer varieties which have superior qualities for consideration as ornamentals.

A thorough-going study of all the lilacs as they are being grown in America has been completed by the Committee on Horticultural Varieties of the American Association of Botanical Gardens and Arboretums. John C. Wister, Director of the Arthur Hoyt Scott Horticultural Foundation at Swarthmore, Pennsylvania, has acted as Chairman of the Committee and Editor of the sixty-four page report "Lilacs for America"* which has just been published. This excellent publication contains the practical information always desired about these plants—the name, color, originator and date of origination of each variety, combined with the very practical information of where they are actually being grown and who has them for sale in America.

This is not all. Most of the varieties have been judged (in flower) and scored on a numerical basis, by a group of competent individuals. These studies were made in all the larger lilac collections in this country, and many a long row of lilacs in the larger nurseries was scored in the same manner. This information was then carefully tabulated, and recorded, and in this publication the totals of all the tabulations are listed. Because of this, one can see at a glance which varieties do well, which are little known and which are "obsolete." To summarize

*Wister, John C. Lilacs for America. Published by Arthur Hoyt Scott Horticultural Foundation, Swarthmore College, Swarthmore, Pennsylvania. April, 1942. (Additional copies are available.)

its work, the committee selected one hundred lilacs which it considered to be the best of all, chiefly on account of the high scores these varieties received when grown under different conditions or because of their superior qualities when compared with other varieties. These one hundred lilacs are listed on the following pages, and should be given primary consideration by anyone purchasing lilac plants.

“The Best” of the Common Lilacs and Early Hybrids

S—Single flowers

D—Double flowers

N—Novelty; i.e., a comparatively “new” variety which has not been tried for many years, but which looks as if it might have considerable merit.

White

Total Varieties Considered 66

Candeur (S) (N)
 Edith Cavell (D)
 Ellen Willmott (D)
 Jan van Tol (S)
 Jeanne d’Arc (D)
 Marie Finon (S)
 Marie Legraye (S)
 Mme. Casimir Perier (D)
 Mme. Felix (S)
 Mme. Florent Stepman (S)
 Mme. Lemoine (D)
 Mont Blanc (S)
 Monument (S) (N)
 Siebold (D)
 Vestale (S)

Violet

Total Varieties Considered 13

Cavour (S)
 De Miribel (S)
 Le Notre (D)
 Marechal Lannes (D)
 Violetta (D)

Blue and Bluish

Total Varieties Considered 72

Ambassadeur (S) (N)
 Ami Schott (D) (N)

Bleuatre (S)

Boule Azuree (S)
 Decaisne (S)
 Diplomate (S) (N)
 Duc de Massa (D)
 Emile Gentil (D)
 Firmament (S) (N)
 General Sherman (S)
 Jules Simon (D)
 Maurice Barres (S)
 Olivier de Serres (D)
 President Grevy (D)
 President Lincoln (S)
 President Viger (D)
 Rene Jarry-Desloges (D)

Lilac

Total Varieties Considered 98

Christophe Colomb (S)
 Henri Martin (D)
 Hippolyte Maringer (D)
 Jacques Callot (S)
 Leon Gambetta (D)
 Marengo (S)
 President Fallieres (D)
 Rosace (S) (N)
 Thunberg (D)
 Victor Lemoine (D)
vulgaris (vulgaris coerulea) (S)
 Wm. C. Barry (S) (N)

Pink and Pinkish

Total Varieties Considered 78

Belle de Nancy (D)
Capitaine Perrault (D)
Frau Wilhelm Pfitzer (S)
Jean Mace (D)
Jules Ferry (D)
Katharine Havemeyer (D)
Lucie Baltet (S)
Macrostachya (S)
Montaigne (D)
Mme. A. Buchner (D)
Virginite (D)
Waldeck-Rousseau (D)

Magenta (or Reddish Purple)

Total Varieties Considered 80

Capitaine Baltet (S)
Charles Joly (D)
Congo (S)
Georges Bellair (D)
Marceau (S)
Marechal Foch (S)
Massena (S)
Mme. F. Morel (S)
Mrs. Edward Harding (D)
Paul Deschanel (D)
Paul Thirion (D)
President Loubet (D)
President Poincare (D)
Reaumur (S)
Ruhm von Horstenstein (S)

Purple (or Deep Purple)

Total Varieties Considered 93

Adelaide Dunbar (D)
Diderot (S)
Etna (S) (N)
J. De Messemaeker (S)
La Place (S)
Ludwig Spaeth (S)
Monge (S)
Mrs. W. E. Marshall (S)
Paul Hariot (D)
Prodige (S) (N)
Toussaint l'Ouverture (S)
Volcan (S)

Early Hybrids*

Total Varieties Considered 33

Assessippi (S) (N) Lilac
Buffon (S) Pink
Catinat (S) Pink
Lamartine (S) Pink
Louvois (S) Violet
Mirabeau (D) Lilac
Montesquieu (S) (N) Magenta
Necker (S) Pink
oblata dilatata (S) Pink
Pocahontas (S) Purple
Vauban (D) Pink
Villars (S) Lilac

*Note. With the exception of this group of "Early Hybrids" all others in this list are varieties of *Syringa vulgaris*. Many species together with their botanical varieties are highly valued for their flowers, but these were not considered when making this list of one hundred varieties.

NOTES

This past winter was a very mild one as far as it effected trees and shrubs. There are several ways of determining this. Thus the flowers of *Abeliophyllum distichum* are unusually profuse and well formed this spring with no injured flowers apparent in the large clusters. The same is true with the flowers of *Viburnum fragrans*. The flower buds of both of these species are prominent throughout the winter and suffer materially in unusually cold winters, the flowers in this climate appearing at their best in only one year out of three. Further south of course, where the winters are always milder, these two shrubs can always be depended upon to produce many flowers annually, but this is not true in Massachusetts. They usually produce some flowers, but in certain years the flower buds are so injured by cold weather that the few flowers which do develop are of little or no value from an ornamental standpoint.

The flower buds of *Cornus florida* have not been injured. Last year approximately fifty percent of them were killed, and by this time had fallen from the trees; but this year the flower buds are not only very numerous but are in splendid condition so that it is reasonable to expect one of the best displays of flowering dogwoods in recent years.

Minor twig injury has been observed here and there on somewhat tender shrubs but everything considered, woody plants have come through the winter very well indeed.

Plants in bloom at the Arboretum now include the Forsythias, *Magnolia denudata*, *M. stellata*, *M. soulangeana* varieties, *Abeliophyllum distichum*, *Benzoin aestivale*, *Dirca palustris*, *Prunus davidiana* (some of the early Japanese flowering cherries will probably be in bloom some time during the week of April 27), *Prunus apetala*, *P. cyclamina*, *P. armeniaca*, *P. tomentosa*, *Rhododendron mucronulatum*, *R. dauricum sempervirens*, *Pieris floribunda* and *P. japonica*. *Cornus mas*, the *Corylopsis* species and *Lonicera standishi* have been in bloom for some time but have passed the peak of their flower.

Also the flowers of *Taxus cuspidata* are now open and this is **the best time of year** to distinguish between the plants with **staminate flowers** (about $\frac{1}{4}$ " long from which pollen falls) and the fruiting plants with **pistillate flowers** (minute, merely a pistil, sometimes not much over $\frac{1}{8}$ " long).

DONALD WYMAN

ARNOLDIA



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THE MEDICINAL PLANT GARDEN OF THE MASSACHUSETTS COLLEGE OF PHARMACY

THE Medicinal Plant Garden of the Massachusetts College of Pharmacy came into being in March, 1941, as the result of the cooperative support of the Arnold Arboretum. Dean Howard C. Newton and Dr. Heber W. Youngken of the Massachusetts College of Pharmacy, one of the state's oldest institutions, drew up the general plans for the garden and the Arnold Arboretum loaned about two acres of land on the grounds of the Bussey Institution of Harvard University for the development of the medicinal plant garden. The officials of both institutions welcomed the opportunity of cooperating in this way on a project of such economic value. This medicinal garden is financed and operated by the Massachusetts College of Pharmacy but is open to the inspection of any visitors at the Arnold Arboretum. Plants are carefully labeled and both institutions join in inviting the public to visit it. It is easily accessible, being on the point of land nearest to the Forest Hills Elevated Station. As one walks up South Street from the elevated station, turn in the first gate, walk nearly to the large stone building, then right, and it will be at the end of the grass roadway running between the two experimental plots.

The garden occupies an area of about two acres and has been laid out in rectangular, circular and crescentic beds under the direction of Dr. Youngken, Professor of Pharmacognosy and Botany at the Massachusetts College of Pharmacy, and his assistant, Dr. M. W. Quimby. Seventeen of these beds were completed by the early part of last summer and fully planted. Around the border of the garden have been introduced a variety of medicinal trees including sweet gum, witch-hazel, sassafras, prickly-ash, elder, upland sumach, viburnums, buckthorn, alder-buckthorn, sugar maple, junipers, bayberry, white-oak, etc.

Two experimental beds for the breeding of drug, insecticidal and oil plants are

located on the north side of this garden. Some ornamental plants have been added to enhance the beauty of the garden.

Planting began on April 19, 1941, and by early summer 382 different species and varieties of plants, mostly medicinal and aromatic, had been established.

The purposes of the garden are (1) to provide added facilities for the teaching of Botany and Pharmacognosy by enabling students to see and study the growing medicinal, oil-yielding and aromatic plants which yield many of our drugs and condiments, (2) to provide authentic plant materials needed for class work and investigation, (3) to ascertain which medicinal plants of exotic origin can be grown successfully in this part of New England, (4) to endeavor to ascertain what nutrient and other factors are essential to the yield of drugs of superior quality.

HEBER W. YOUNGKEN,
Dept. of Materia Medica,
Massachusetts College of Pharmacy,
Boston, Massachusetts

**Species grown in the medicinal plant garden
of the Massachusetts College of Pharmacy in 1941**

<i>Acer saccharum</i>	<i>Arnica montana</i>
<i>Achillea Ageratum</i>	<i>Artemisia Abrotanum</i>
“ <i>Millefolium</i>	“ <i>Absinthium</i>
“ <i>tomentosa</i>	“ <i>albula</i>
<i>Aconitum autumnale</i>	“ <i>annua</i>
“ <i>Fischeri</i>	“ <i>Dracunculus</i>
“ <i>Napellus</i>	“ <i>frigida</i>
<i>Actaea alba</i>	“ <i>pontica</i>
“ <i>rubra</i>	“ <i>vulgaris (lactiflora)</i>
<i>Adonis aestivalis</i>	<i>Asarum canadense</i>
<i>Aegopodium Podagraria variegatum</i>	<i>Asclepias tuberosa</i>
<i>Agastache Foeniculum</i>	<i>Asperula odorata</i>
<i>Ajuga ciliata</i>	<i>Atropa Belladonna</i>
“ <i>reptans</i>	<i>Borago officinalis</i>
<i>Alchemilla vulgaris</i>	<i>Brassica alba</i>
<i>Allium Cepa viviparum</i>	“ <i>nigra</i>
“ <i>Schoenoprasum</i>	<i>Campanula rotundifolia</i>
<i>Althaea rosea</i>	<i>Capsicum frutescens</i>
<i>Anacyclus Pyrethrum</i>	<i>Carthamus tinctorius</i>
<i>Anchusa officinalis</i>	<i>Carum Carvi</i>
<i>Anemone Pulsatilla</i>	<i>Cassia marilandica</i>
<i>Anethum graveolens</i>	<i>Caulophyllum thalictroides</i>
<i>Angelica sp.</i>	<i>Chaenomeles japonica hyb.</i>
“ <i>Archangelica</i>	<i>Chamaelirium luteum</i>
<i>Anthemis nobilis</i>	<i>Chelidonium majus</i>
<i>Anthriscus Cerefolium</i>	<i>Chenopodium ambrosioides anthelminticum</i>
<i>Aquilegia canadensis</i>	<i>Chenopodium bonus-henricus</i>
<i>Aralia nudicaulis</i>	“ <i>Botrys</i>
“ <i>spinosa</i>	<i>Chionanthus virginicus</i>
<i>Aretium minus</i>	<i>Chrysanthemum Balsamita</i>
<i>Arisaema triphyllum</i>	

Chrysanthemum Balsamita tanacetoides
Chrysanthemum cinerariaefolium
 " *coccineum*
 " *Parthenium*
Cichorium Intybus
Cimicifuga racemosa
 " *simplex*
Cnicus benedictus
Colchicum autumnale
Comptonia peregrina
Convallaria majalis
Coptis groenlandica
 " *occidentalis*
Coriandrum sativum
Crocus sativus
Cunila mariana
Cynoglossum officinale
Cytisus Scoparius
Daphne Mezereum
 " " *alba*
Datura Metel
 " *Stramonium*
 " *Tatula*
Delphinium ajacis
 " *hybrid* (*Belladonna*)
 " " (*Bellemosum*)
Dicentra canadensis
 " *Cucullaria*
 " *eximia*
 " *spectabilis*
Digitalis ambigua
 " *purpurea*
Dioscorea villosa
Dipsacus fullonum
Dryopteris Filix-mas
 " *marginalis*
Ephedra distachya
 " *equisetina*
 " *sinica*
 " *sp.*
Euonymus atropurpureus
Eupatorium purpureum
Filipendula hexapetala
 " *Ulmaria*
Foeniculum vulgare
Galium verum
Geranium maculatum
Hanamelis virginiana
Hemerocallis fulva

Heuchera sanguinea
Hydrastis canadensis
Hydrophyllum virginianum
Hyoscyamus niger
Hyssopus aristatus
 " *officinalis*
 " " *albus*
 " " *ruber*
Isatis tinctoria
Jeffersonia diphylla
Juniperus Sabina
 " *virginiana*
Lallemantia canescens
Lanum album
 " *maculatum album*
 " *purpureum*
Lavandula officinalis
 " *Spica*
Leonurus Cardiaca
Levisticum officinale
Linum perenne
 " *usitatissimum*
Lippia citriodora
Liquidambar Styraciflua
Lobelia cardinalis
 " *inflata*
 " *siphilitica*
Lupinus (*Russel hybrids*)
Mahonia Aquifolium
Majorana hortensis
Marrubium peregrinum
 " *vulgare*
Matricaria Chamomilla
Melissa officinalis
Mentha aquatica × *rotundifolia*
 " *arvensis*
 " " *piperascens* × *aquatica*
 " " " × *spicata*
 " *citrata*
 " *crispa*
 " *longifolia*
 " *niliaca*
 " *piperita*
 " *Pulegium*
 " *rotundifolia*
 " " *(sterile male)*
 " " *vaiegata*
 " *spicata*
Mirabilis Jalapa
Monarda didyma

Monarda fistulosa	Salvia azurea
“ punctata	“ officinalis
Myrica pensylvanica	“ “ albiflora
Myrrhis odorata	“ pratensis
Myrtus communis	“ Sclarea
Nepeta Cataria	Sambucus canadensis
“ hederacea	Sanguinaria canadensis
“ Mussinii	Sanguisorba canadensis
“ nuda	“ minor
Nicotiana Tabacum vars.	Santolina Chamaecyparissus
Ocimum Basilicum	“ viridis
Origanum Dictamnus	Sassafras albidum
“ Majorana	Satureia alpina
“ vulgare	“ hortensis
Ornithogalum sp.	“ montana
“ umbellatam	“ Nepeta (Calamintha)
Osmorhiza Claytonii	“ vulgaris
“ longistylis	Scutellaria alpina
Panax quinquefolium	“ baicalensis
Passiflora incarnata	Sesamum alatum
Pedicularis canadensis	Silybum Marianum
Petasites japonicus	Sium Sisarum
“ officinalis	Spigelia marilandica
Petroselinum crispum	Symphytum asperum
Phytolacca americana	“ officinale
Pimpinella Anisum	Tanacetum vulgare
Pinus Strobus	Teucrium Chamaedrys
Plantago indica (P.arenaria)	Thymus britannicus
“ lanceolata	“ Herba-barona
“ ovata	“ lanicaulis
“ Psyllium	“ Serpyllum
Podophyllum peltatum	“ “ coccineus
Polygonum Bistorta	“ “ variegatus
Potentilla alpina	“ vulgaris
“ Anserina	Tradescantia virginiana
“ tridentata	Trillium erectum
Pulmonaria angustifolia	“ grandiflorum
Pycnanthemum sp.	“ sessile
Ranunculus Ficaria	Tussilago Farfara
Rhamnus cathartica	Urginea maritima (red var.)
“ Frangula	Valeriana officinalis
“ Purshiana	Vancouveria hexandra
Rhus glabra	Veratrum viride
“ typhina	Veronica incana
Ricinus communis	“ virginica
Rosa centifolia	Viburnum Opulus
Rosmarinus officinalis	“ prunifolium
Rumex Acetosa	“ trilobum
“ scutatus	Viola cucullata
Ruta graveolens	“ odorata



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EUONYMUS

THE various plants belonging to the Euonymus clan are not to be considered as constituting one of those "neglected" groups which should be grown more in our gardens. On the contrary, there are probably too many forms of Euonymus available from nurseries now. A resumé of nursery catalogues shows that approximately thirty different species and varieties can be purchased in this country, and it is certainly doubtful if all of these are of sufficient ornamental value to make them worth while. Some of the most common are the evergreen vines, of course, while others are the taller growing trees and shrubs. The evergreen types are valued for their foliage, while the deciduous types are valued chiefly for their brilliantly colored fruits and the bright autumn color of their foliage.

Most of the deciduous forms, like *Euonymus alata*, *E. yedoensis* and *E. sanguinea* have foliage which turns a brilliant scarlet in the fall. On the other hand, a few like *E. Bungeana* and *E. lanceifolia* turn a pale yellow in the fall. Still others like *E. europaea* retain their green leaves in the fall considerably longer than most shrubs.

The fruit is conspicuous chiefly because of the bright colored capsule (usually red or pink) which opens in late September or in October, disclosing the bright orange or red fleshy covering of the seed, called the aril. Sometimes, as in the case of *E. Bungeana semipersistens*, the capsule is light pink, and the aril is a deep orange. In other instances, as in the case of *E. sanguinea*, the capsule is a deep red, and in still others (*E. europaea* and *E. e. atrorubens*) the capsule is a vivid red and the aril is bright orange, making an excellent color combination.

The fruits of a few color early in the fall and drop shortly afterward. Such for example would be *E. latifolia*, *E. sachalinensis* and *E. sanguinea*. In others, the fruit remains on the plant a considerable time in the fall lending much ornamental interest, as for example *E. Bungeana semipersistens*. The flowers of most are inconspicuous and are hence of no ornamental value.

A few of the *Euonymus* are grown for their form or habit of growth. *Euonymus alata*, for instance, has a typically horizontal method of branching, and its variety *compacta* is valued for its low, dense habit. On the other hand, *E. europaea* and its varieties are vigorously upright, while *E. Bungeana* and its variety *semipersistens* is a small tree, with broad, spreading, almost pendulous branches. Unfortunately most of these plants are susceptible to an especially pernicious scale, the *Euonymus* scale, and unless this is kept in check by effective spraying, serious difficulty is encountered in growing *Euonymus* effectively in the garden. I do not mean to black-list all *Euonymus*. However, I do think it advisable to study their respective characteristics carefully and select only a few which may be best adapted to ornamental usage.

Growing in the Arboretum are species from North America, Europe, China and Japan. Popularly called the spindle-tree this name probably belongs to *E. europaea* a native of Europe, for the wood is very hard and in earlier times was used in making spindles. Because this species has been in cultivation so long, there are a number of horticultural varieties, some of which are very much worth while and surpass the original species in beauty.

The American *Euonymus* are three in number, *E. americana*, often called the strawberry-bush because of its prickly bright red fruits; *E. atropurpurea*, called the Wahoo; and *E. obovata*, a little ground cover or procumbent shrub. Though these are used in naturalistic plantings, they are not sufficiently outstanding in their performance in the Arboretum to be considered as valuable ornamentals.

Since thirty-seven of the *Euonymus* are growing in the Arboretum collections, it may be well to note those which are doing best.

Trees

One of the most common of the *Euonymus* in American gardens is *E. europaea*, a large shrub or small tree. When grown from seed, this plant varies considerably, so much so that at least ten varieties have been named. The best in the group is *E. europaea intermedia* which first appeared in 1828. This variety has very dense foliage, larger leaves than the species, and excellent annual crops of dark red fruits that are much larger and darker-colored than the type. Frequently when *E. europaea* is grown from seed, the fruit of the resulting plants is a poor pink, hence decidedly mediocre in color. The variety *intermedia* is much superior, the fruits being the darkest red of all *Euonymus*. Other varieties of *E. europaea* like *atrorubens* (not to be confused with *E. e. atropurpurea* which has purplish leaves) and *aldenhamensis* also have fruits of more vivid color than the species. All should be propagated asexually. An interesting form of *E. europaea* in the Arboretum is a definitely globe-shaped form—a plant now ten feet tall with single four-foot trunk topped by a definitely globose head about six feet in diameter. This plant originally came from the Hesse nurseries in Germany in 1909 and does have ornamental possibilities, though it is not available from nurseries. All va-



PLATE VIII. Showing the variations in leaves and buds of some *Euonymus* species.

1. *E. kiautschovica* 2. *E. alata* 3. *E. americana* 4. *E. nana* 5. *E. yedoensis* 6. *E. bulgarica*
E. sachalinensis 8. *E. sanguinea* 9. *E. macrophylla* 10. *E. sachalinensis* 11. *E. latifolia*
E. yedoensis 13. *E. Maackii* 14. *E. europaea* 15. *E. alata* 16. *E. nikoensis* 17. *E. bulgarica*

rieties of *E. europaea* retain their leaves very late in the fall, this being an important character.

Another tree form is *E. Bungeana semipersistens*, a wide spreading, small tree valued because it is one of the last deciduous trees in the Arboretum to drop its leaves in the fall. Added to this important feature is the fact that it is covered with a wealth of pale pink fruits, which open late and remain on the tree well into the winter.

Euonymus Maackii and *E. sanguinea* are two other valued tree Euonymus. Especially are they important for the fact that their leaf buds are among the first to open in the spring, showing considerable color about the middle of March. Though Euonymus as a group develop their leaves early, these two are about the earliest of anything in the Arboretum except *Prinsepia sinensis* which is always first. Both have brilliant red autumn color, the leaves of *E. sanguinea* being reddish underneath and often slightly curled. It should be said, also, that *E. sanguinea* has done exceptionally well in the Arboretum with vigorous branches and dense foliage, and makes one of the best Euonymus from the standpoint of foliage alone. Its fruit opens early, and falls shortly afterward (about October 1 this year), usually some time before the leaves fall from the plant. Because of this and the fact that the fruits are not borne profusely, it should only be used for its good foliage.

Shrubs

The most common shrub is *E. alata*, valued for its horizontal habit of growth and its fiery red autumn color. The variety *compacta* is also a valued plant, originating in 1926 as a chance seedling in the Adams Nursery, Springfield, Massachusetts. Because of the low compact habit of growth of this variety, it is well adapted for specimen planting or use in hedges. *Euonymus yedoensis* is somewhat similar to *E. lanceifolia* in general appearance except that it is a shrub and not a tree. In the fall its leaves turn a brilliant red and its fruits are brilliantly colored, comparing favorably with the best. The leaves are often four to five inches long, the largest of any of the Euonymus grown in the Arboretum, with the exception of *E. macroptera*, which has leaves of a similar size.

The evergreen *E. japonica* is not hardy in Massachusetts, but south of Philadelphia, it is used a great deal and to good advantage. There are several varieties of this species, one with smaller leaves and some with variegated leaves. Where hardy, it does well along the seashore, and has been used in European gardens for over a century. A hardier evergreen is *E. kiautschovica* (formerly called *E. patens*), which does winter over in the Arboretum and can be considered semi-evergreen here, being valued for its foliage and late, attractive fruits. This was introduced by Dr. G. R. Hall from Japan in 1861 and does very well at Newport, R. I. *Euonymus bulgarica* might also be mentioned as one of the shrubby types with unusually good foliage. It is dense and dark green, the leaves slightly ru-



SPENCER LENS CO. BUFFALO N. Y.

PLATE IX

Top row left to right. *E. Fortunei* varieties, *kewensis*, *minima*, *colorata*, *radicans*
 Second row. A leaf from each slightly enlarged
 Third row. *E. Fortunei* vars. "Silver Queen," *gracilis*, *reticulata*, *vegeta*, *Carrierei*
 Fourth row. A leaf from each slightly enlarged



Name	Height	Evergreen or Deciduous	Habitat	Hardiness Zone	When Introduced	Prominent Ornamental Characteristics				
						Fruit	Autumn Foliage	Summer Foliage	Early Foliage	Habit of Growth
<i>Euonymus</i>										
* <i>alata</i>	9'	D	N. E. Asia	3	about 1860		† red	†	†	† horizontal branches
— <i>aperta</i>	9'			3			† red	†	†	“ “
*— <i>compacta</i>	6'	D	hort. var.	3	1926		† red	†	†	† low & dense
<i>americana</i>	7½'	D	N. Y. to Fla. & Texas	6	1697					
<i>atropurpurea</i>	24'	D	N. Y. to Fla. w. to Minn., Neb., Okla. & Texas	4	1756	† red	† red			
<i>bulgarica</i>	10' ?	D	S. E. Europe	5	1903	red †		†		dense, upright
<i>Bungeana</i>	18'	D	N. China, Manchuria	4	1883		yellow			† wide & rounded
*— <i>semipersistens</i>	18'	D		4		† pink	† yellow			“ “
<i>europaea</i>	20'	D	Eu. to W. Asia—some- times escaped in E. states	3	long cult.		dull red	†		† upright
— <i>aucubaeifolia</i>	20'	D	hort. var.	3			dull red	†		† “
— <i>alba</i>	20'	D	hort. var.	3		† white	dull red	†		† “
*— <i>aldenhamensis</i>	20'	D	hort. var.	3		† scarlet	dull red	†		† “
*— <i>atrorubens</i>	20'	D	hort. var.	3		† scarlet	dull red	†		† “
*— “Globe form”	18'	D	hort. var.	3	1909	† scarlet	dull red	†		† globe shape
*— <i>intermedia</i>	20'	D	hort. var.	3	1828	† scarlet	dull red	†		† upright
— <i>nana</i>	4'	D	hort. var.	3						† low dwarf
<i>fimbriata</i>	10' ?	D	Himalaya	7 ?	1920					
* <i>Fortunei</i>	vine	E	China	5	1907					† vine
*— <i>Carrierei</i>	vine	E		5	1881			†		† vine
*— <i>colorata</i>	vine	SE	China	5	1914		† red			† vine
— <i>gracilis</i>	vine	E		5				†		† vine
*— <i>kewensis</i>	vine	E	Japan	5	1893			†		† vine
*— <i>minimus</i>	vine	E	Japan ?	5				†		† vine
*— <i>radicans</i>	vine	E	Japan & S. Korea	5	about 1865			†		† vine
— <i>reticulata</i>	vine	E		5				†		† vine
*— <i>vegeta</i>	4' or climbing if supported	SE	Japan	5	1876	† pink		†		† prostrate shrub
<i>Hamiltoniana</i>	20'	D	Himal. prob. not now in cult.	7 ?	1825	† red				
<i>hians</i>	10'	D	Japan	5	about 1865	† red				
<i>japonica</i>	20'	E	Japan	7	1804			†		† dense
* <i>kiautschovica</i>	9'	SE	E. & C. China	6	about 1860	† red		†		† dense
* <i>lanceifolia</i>	30'	D	C. & W. China	5	1900 or 1904		yellow	†		† pyramidal
<i>latifolia</i>	21'	D	S. Eu. & W. Asia	5	1730	deep red				
<i>Maackii</i>	20'	D	N. China to Korea	4	1880	deep red	† red		†	
— <i>lanceolata</i>	20'	D		4		deep red	† red		†	
<i>macroptera</i>	10' ?	D	N. E. Asia, Japan	5	1906				†	
<i>nana</i>	3'	D	Cauc. to W. China	2	1830					† dwarf
<i>nikoensis</i>	25'	D	Japan	5	1930					
<i>obovata</i>	ground cover	D	Can. to Ind. & Ky.	3	1820	† red	† red	†		† prostrate shrub
<i>oxyphylla</i>	25'	D	Japan	5	1892		† red			
<i>pauciflora</i>	6'	D	N. E. Asia	4	1934					
<i>phellomana</i>	15'	D	N. & W. China	5 ?	1928					† horizontal & pendulous branches
<i>sachalinensis</i>	12'	D	N. E. Asia	5	1892				†	
* <i>sanguinea</i>	21'	D	C. & W. China	5	1900		† red	†	†	† pyramidal
<i>Semenovii</i>	10'	D	Turkestan	5	1910					
<i>semiexserta</i>	10'	D	Japan	5	1895					
<i>verrucosa</i>	6'	D	S. Europe, W. Asia	3	1763					
<i>yedoensis</i>	12'	D	Japan, Korea	4	about 1865	† red	† red			

*—Those species or varieties which are of most interest in the Arnold Arboretum.

†—This particular character is outstanding, sufficiently so to make the plant ornamentally valued for this reason.

gose. Sometimes it develops corky wings on the more vigorous branches.

Vines

The evergreen vines in the *Euonymus* clan are the ones most commonly seen in American gardens. *Euonymus Fortunei radicans* (formerly *E. radicans*) is the most commonly planted of all. On older plants, considerable variation occurs in the leaves and it is not unusual to find foliage of several different types growing on the same plant. Some of these can be grown asexually, and have given rise to certain varieties. For instance, *E. Fortunei vegeta* is one of the best of all the fruiting *Euonymus*, being a vine or prostrate shrub. Its large leaves are not quite evergreen in New England but then do remain on the plant a considerable time in the fall. The variety *Carrierei* has leaves more pointed at the tip and is not nearly as fruitful as is *vegeta*. The variety *colorata* is really a ground cover, noted for its reddish foliage in the fall, and *E. Fortunei* (formerly *E. radicans acuta*) is frequently planted for its larger pointed leaves.

Many variegated forms have appeared; there is usually a variegated branch or two on every plant of *Carrierei*. *Euonymus Fortunei gracilis* is the name which has been given to include some of these forms. "Silver Queen" is one with unusually large variegated leaves.

Two small leaf forms are available, though often not correctly named in the trade. *Euonymus Fortunei minima* was originally raised by Simon-Louis, a French nursery firm, during the last century, and has leaves the larger of the two forms. *E. radicans kewensis* was raised from seed sent by Professor Sargent from Japan to the Arboretum and then to Kew Gardens in 1892. This variety has the smallest leaves of all, being only $\frac{3}{8}$ of an inch long, while those of *minima* are nearly twice the size. Both these small leaved varieties are evergreen, cling well to stone walls, and are admirable when used to cover low rocks or bare spaces in the rock garden; but because of their small size, they do not grow as rapidly as the other larger leaved forms.

All the *Euonymus* growing in the Arboretum are included in the table on pages 46-47. An attempt has been made to point out their habitat or source of origin and also to check those characteristics for which they are particularly valued. It will be noted that some have little value while others are important for several reasons. Such a table often aids materially in quickly emphasizing the value of certain plants when compared with others. This table might well be checked further after a study of the *Euonymus* as they grow under various local conditions, for this might reveal points not noted by performance under Arnold Arboretum conditions.

Euonymus Scale

Some of the *Euonymus*, particularly *E. Fortunei* and its varieties are susceptible to the pernicious *Euonymus* scale. This is controllable when fought in its earlier stages, but if allowed to thrive for several years, infestation may become so severe

that control measures do not prove satisfactory. Then the best means of eradication is to cut the vines to the ground and start over again. The mature female scale resembles the oyster-shell scale. The insects winter in New England either as eggs or as fully grown female scales. In the early spring the young appear and even in New England there may be as many as three generations in one season. Consequently, it can be seen how quickly this pest becomes serious, for if only a small infested area exists after one spraying, this area can be increased so rapidly that another general infestation soon results. Thorough spraying with a dormant oil usually controls this pest. At the Arboretum we have used Sunoco oil as a dormant spray at a ratio of 1-30. In the summer when it has been necessary to spray on account of additional broods, we have used Sunoco oil at a ratio of 1-50 but it is essential in using the summer oil spray to apply it only on cloudy days when the air temperature is below 80° F. Fortunately the shrubby *Euonymus*, with the possible exception of *E. americana* and *E. japonica*, are not as susceptible as the vine types, but it should be remembered that all *Euonymus* are susceptible and they should not be planted unless the proper steps can be taken for spraying them when the scale appears.

DONALD WYMAN

Collection of Clematis given the Arboretum

A valuable collection of approximately ninety Clematis species and hybrids was given the Arboretum this month by Louis Vasseur of Milton. Mr. Vasseur has been raising and hybridizing Clematis for years, having learned much about their care and culture in France many years ago. The collection he has turned over to the Arboretum represents a long period of painstaking efforts in hybridization, chiefly with *Clematis lanuginosa* hybrids. Some of the plants are as much as fifteen years old.

Though the plants were cut back severely with only a few inches of the stems now remaining, it is hoped that in a short time this will be the nucleus of one of the most complete Clematis collections in this country. All these plants have been planted at the base of a seven-foot woven wire fence bordering the tract adjacent to the Adams House grounds.

Added to this valuable collection is another group of Clematis given the Arboretum by a nursery which specializes in growing these interesting vines. This additional gift totals thirty-four different species and named varieties, with more to come next spring. Special care will be given these vines and it is hoped that they will thrive under Arboretum conditions. After all, Clematis can be grown in New England, and we hope that within a short time there will be many beautiful plants here to demonstrate this thoroughly.

New Building Dedicated at Morton Arboretum

The beautiful Thornhill Building was dedicated at the Morton Arboretum on September 25, Dr. E. D. Merrill, Director of the Arnold Arboretum, being the guest speaker at the dedication exercises. This new building occupies the site of "Thornhill," the former residence of the Arboretum's founder, Mr. Joy Morton, and the dedication occurred in the twenty-first year of the existence of the Morton Arboretum. The library wing of "Thornhill" was preserved, forming the stack room of the new building. This is a valuable addition to the Morton Arboretum and makes possible the amplification of many of its services.

In his address at the time of the dedication, Dr. Merrill discussed the history and accomplishments of the Arnold Arboretum which was the progenitor of the Arboretum idea, having been established in 1872. Since the establishment of the Morton Arboretum, there have been many cases of mutual assistance between these two great plant growing institutions, and, to commemorate this cooperation, Mrs. Joseph M. Cudahy, Chairman of the Board of Directors of the Morton Arboretum, has presented the Arnold Arboretum with a splendid four-foot specimen of Meyer's Juniper, a duplicate of which was planted near the Thornhill building by Dr. Merrill. These two plants, although now growing so far apart, will commemorate the excellent spirit of cooperation and mutual assistance existing between the two institutions.

Recent Important Publications

Announcement is made of a *reissue* of the important "Monograph of Azaleas" pp. i-iv, 1-219. 1921 (Arnold Arboretum Publ. 9, out of print for about ten years) by Rehder and Wilson, the reissue is priced at \$4.00 instead of the original \$5.00 per copy. So many orders for this important out-of-print work were received that it became desirable to reissue it in facsimile form. The Arboretum has also received a number of copies of Metcalf's "Flora of Fukien and Floristic Notes on Southeastern China," published by Lingnan University, fasc. 1, pp. i-xviii. 1-82, 2 maps. 1942; the price of this is \$1.50. The first two numbers of the technical publication *SARGENTIA* (named in honor of Charles Sprague Sargent) which replaces the old "Contributions of the Arnold Arboretum" series have been issued. The first consists of a paper by Dr. A. C. Smith based on the Fiji collections secured on the voyage of the "Cheng Ho" sponsored by Mrs. Anne Archbold and entitled "Fijian Plant Studies, II." pp. 1-148, July, 1942, priced at \$2.50; and the second is by Dr. Hui Lin Li, entitled "The Araliaceae of China," pp. 1-134, November, 1942, priced at \$2.25.

A very important facsimile lithoprint reproduction of the very rare *Autikon Botanikon* by C. S. Rafinesque, Philadelphia, 1840, is also announced. This is a 200 page volume of which only about a dozen copies are known to exist, touching all parts of the world. This facsimile reprint is priced at \$3.00

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AN AMATEUR'S OBSERVATIONS ON HARDINESS FROM GROWING RHODODENDRONS IN THE PACIFIC NORTHWEST

THE chief difficulty in discussing this subject lies in the fact that few people are in agreement as to just what constitutes "hardiness." To some it means a plant which will never "winterkill." To others it means a plant the flowers of which are never injured by late frosts. To a third group it means a plant which weathers the ordinary winter but may react unfavorably under unusual climatic conditions. There are thousands of other gradations of thought depending upon the individual and his experiences.

In a recent discussion of this subject conducted by an English garden magazine one prominent grower gave his definition for hardiness as a plant which is "locally tolerant." This may only shift the discussion from the meaning of hardiness to that of tolerance, but to me it has much merit. We are often guided in purchasing plants on the basis of our zone rating which in general is a valuable guide but with "border line" varieties, this may be inaccurate for a certain locality.

It behooves us, therefore, to study not only our zone conditions and other factors which in a general way influence hardiness, but to bring our problem directly to our own gardens.

First among the general factors is the early fall frost. While such frosts are unusual in the Pacific Northwest, they do occasionally occur and may prove disastrous to some plants. Some years ago a Northern California nurseryman lost an entire field of *Rhododendron* "Britannia" due to an October freeze. This might have been a purely local condition but my own experience indicates that this occurs more often when plants do not receive proper care. Either late fertilizing or late watering may cause such a loss, for both stimulate late vegetative growth which may not have time to mature and therefore be susceptible to an early frost. I suffered a similar loss with a group of *R. Augustinii* but in my case only the new growth was injured. Second growth is nearly always too tender to weather

a cold winter. I believe, then, it is safe to say that hardiness may be increased by withholding late feeding and watering so that new growth will enter the winter thoroughly ripened. Many experienced growers in the Pacific Northwest do not water after August 1 except when the plants show definite signs of being affected by drought. This does not mean that they should enter the winter in a dry condition for Eastern growers recommend heavy watering just prior to the advent of cold weather. In the Pacific Northwest our normal rainfall usually cares for this.

The late spring frosts come next and while not numerous here are often most troublesome in England, Holland and Belgium and are known to have caused much damage. The Ghent Azalea originated from the experience of P. Mortier, a baker at Ghent, who endeavored to obtain new hardy varieties with late flowering, by crossing certain hardy azaleas with tender late flowering varieties.

In the Pacific Northwest area the Seattle weather reports show only five days from 1935 to 1941 inclusive when the thermometer touched freezing after March 1. Many people have never had a plant injured after that date, yet I know some localities near the city where much damage has occurred from these frosts which sometimes come as late as May. It is obvious from these facts that there are definite factors applicable to each location and some of these may appear in the following discussion.

Perhaps the first of these would be air drainage. After years of observation I am convinced that this is one of the most important factors in the hardiness of plants. It might be more correct to say it may often be the governing factor in growing a borderline plant.

Cold air, like water, naturally follows the ground and flows to the lowest point. When it enters a confined depression, it remains there like a lake or pool and as additional cold air flows in, the warmer air overflows and the pool constantly becomes colder. Such a depression may prove disastrous to many shrubs. I have seen plants in such an area severely injured while those only a few yards away came through in splendid shape.

Winter injury in many locations is due no doubt to just such a condition. This is especially true in lowlands and valleys where drainage is sluggish. On the other hand, those who have gardens near the salt water generally have an unobstructed flow of cold air. The water of Puget Sound varies only four degrees between summer and winter, and as the hot air rises from this warm area, it makes room for a continuous flow of the colder currents. This is likewise true of hillside locations.

Nearness to water generally stimulates air flow but it is less active adjacent to inland waters as the winter temperature variation of such water is much greater than that of salt water.

Exposure is another factor in hardiness but one hard to determine accurately. It is noticeable that when we have a severe frost, most of the damage is done on the north side of the street, that is, with a southern exposure. This is due according to some authorities to the stimulation which the plant receives from the sun-

light and is especially harmful in the late winter or early spring. At the Arnold Arboretum many rhododendrons do not suffer from severe cold, even zero weather, when they are protected from sunlight and high winds during this period. On the other hand, when plants are in an exposed position, a sharp drop in temperature following bright sunshine will frequently injure the hardiest varieties. Plants with a northern exposure protected from the direct rays of the sun will withstand a severe winter—even a cutting north wind—much better than those subjected to the winter sunshine.

While considering exposures, it might be well to mention again the importance of local conditions, for an open sunny location is more favorable than one against a wall or rock where heat is radiated. Many authorities believe that some plants which we condemn as not being winter hardy are in reality injured during the summer months. In several instances I have seen rock garden rhododendrons die out when placed against a warm rock while those in a more open location survived and prospered. Volunteer Park in Seattle has several examples of open southern exposures where hardy rhododendron varieties prosper and this may be due in part to another factor which must be considered under the head of exposure; that is the intensity of the sun's rays. Ours is often filtered by moisture in the air and by drifting clouds. We seldom have long periods of bright sunshine. Another illustration: the standard practice in planting camellias in the south is to avoid a south or west exposure. My own experience in the Pacific Northwest is that here they do best with a western exposure. This does not change the standard practice in other districts but is evidence of the mildness of our sunshine and brings us back again to local conditions as they effect hardiness.

Exposure to wind must be considered. Rhododendrons outside of a few alpenes will not prosper in a windy location, for winds, especially dry ones, absorb moisture from the evergreen leaves and can be as devastating in their own way as a hot south wall. Hence, a drafty location or a windy corner should be avoided, because of increased transpiration due to the wind and also because the wind lowers the temperature in those places.

Returning again to colder weather, it would appear that the length of time such cold continues or the suddenness of the change may adversely effect the plant more than the low temperature. My own plants recover from a short, sharp cold spell much more rapidly than a long continued one, provided, of course, this cold comes in the middle of winter. It is in the colder winter periods that genetical differences in plants of a certain species or variety become evident, for these, as well as environmental differences, frequently are responsible for many peculiar differences in plant hardiness.

One other thing which might be classed under environment is directional planting. Large evergreen shrubs when transplanted should be faced the same direction as originally grown, especially where they have not been partially protected by nearby trees or shrubs. These plants build up a resistance to light over a

period of years in both leaves and bark and this protection is much greater on the side which was exposed to the sun than on the shady side. A reversal of this position may cause a loss of foliage, bark splitting, and in extreme cases, the loss of the plant itself. This damage is less in areas of mild light intensity than in those of brilliancy and warmth.

These comments, as the subject states, are merely the observations of an amateur, not an attempt at scientific statement, for few amateurs are qualified to make correct deductions from the facts available to them. We do know, however, that hardiness is not a fixed quality; that it can be measured by no given standard; and in the Pacific Northwest it is largely a matter of trial and error. It is hoped that these notes may be of assistance to many plant lovers who wish to bring into their gardens a host of fine plants which, contrary to the usual opinion, can be grown in their localities.

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Note:—These observations of Mr. Herbert Ihrig are made by a man who has been growing many different rhododendron species for years in his beautiful Seattle garden. Although his hardiness observations have been made in the Pacific Northwest and deal with many plants that are not hardy here in New England, nevertheless he has been attempting to grow so many “border-line” plants, that he has had an exceptional opportunity to study hardiness problems by intelligently observing the reactions of these plants as they are grown under varying environmental conditions. Consequently, his hardiness notes are sound and are applicable to rhododendrons as well as to other plants, not only in the Pacific Northwest, but in New England also. Because of his many years experience in growing rhododendrons—a particularly difficult group of plants with many of the species susceptible to winter injury—these hardiness notes should be of interest to **Arnoldia** readers.

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FOLIAGE COLORS OF WOODY PLANTS APRIL TO SEPTEMBER

THE beauties of New England's autumn foliage have been fully described many times, which plants contribute most brilliantly to the display, and how this display differs from year to year, but little information is available about foliage colors of plants throughout the growing season. Nor is there much on record about colors of the early foliage as the leaves unfurl in the spring, how it changes from week to week, approximately when it comes and when it disappears. As a matter of fact, the bright colors of the early spring foliage are almost as beautiful as are the fall colors. All the data included in this paper were recorded in the Arboretum this year in connection with observations made weekly from April to October regarding foliage color changes. Such observations thus methodically recorded will be of considerable interest to the gardening public.

Many horticultural varieties of woody plants may present brilliantly colored foliage in the early spring, and such plants may have been given varietal names because of these characteristics. However, after a few weeks the foliage color gradually fades and by the end of June the leaves become a normal green. Such is the case with the common *Physocarpus opulifolius luteus*. On the other hand, some of the woody plants keep their foliage colors throughout the entire growing season, and such plants should be carefully noted. *Lonicera Korolkovii* is one example, and *Berberis Thunbergii atropurpurea* is another.

This is not in itself a plea for plants with colored or variegated foliage. Such plants are frequently entirely out of place in any landscape picture, simply because the foliage color is so pronounced that the shrub or tree itself is far too obvious and does not blend well with surrounding plantings. Because of their vari-colored foliage, some forms are actually deficient in chlorophyll and hence are sickly in growth and appearance, never developing into the good robust specimens we like to have in our gardens. Consequently, these color forms should be

used infrequently and only on special occasions where considerable thought has been given to their peculiar qualifications.

It should be noted that all the forms mentioned in this paper are in the Arboretum collection and that notes on their colors have been taken from observing the plants themselves, not from previously prepared lists. In recording these observations, it has been found that many plants bearing the varietal names of *lutea* or *aurantescens*, etc., actually do not deserve such names since their color changes are so slight as to have no distinctive or ornamental value whatsoever. Sometimes only young plants will show variations in the foliage color and as they grow older, the foliage reverts to normal green. Such forms are not listed here.

Another point worth mentioning is the fact that when a plant is given a varietal name (either botanical or horticultural) because of its foliage color, for some reason the original plant may die or become "lost" and though the name itself may be carried in text after text, on the authority of the original record supported by herbarium material, it may be impossible to locate a living plant of the variety. From a perusal of various texts one will observe that many species have yellow leaved varieties, but it is extremely difficult to find the living plants of many of these. I reiterate that the plants here listed are actually growing in the Arnold Arboretum, and that the following color notes are based on observations made during the 1942 growing season. If certain named forms with known colored foliage are missing from this list, it means that they are either not in the Arboretum living collections or that their color variations were not sufficiently outstanding to attract attention.

Early Foliage

The past spring was characterized by the relatively early appearance of the young foliage. Thus one willow tree, *Salix alba vitellina*, opposite the Administration Building in the Arboretum, is among the first trees to display its green foliage in the early spring. Frequently the buds are so far advanced that if a day or night with unusually warm temperature occurs at the right time, the tree will turn from an apparently inanimate object to a thing of living green almost overnight. During the past three years the tree turned green overnight on the following dates:—1940, May 1; 1941, April 15; 1942, April 6. From such data one can readily obtain an idea of the temperatures prevalent during the early spring. In 1940 the season was very late and in 1942 it was distinctly early. Consequently, actual dates of leaf appearance are not dependable from year to year for individual species, yet it is interesting to note the number of trees which come into early foliage together and which thus react regardless of whether the season is early or advanced.

The various colors of the young foliage of trees and shrubs are just as beautiful as are those in autumn foliage, only less vivid. Little attention is paid these early colors, possibly because they do not last very long, and also because so much that is interesting happens in the early spring when everything seems to be break-

ing into new life that our attention is being called a hundred places at once. However, I suggest that a study of the early spring colors next year will repay the effort to anyone interested in plants and plant life. The following forms all showed color prior to May 1, 1942, and most of them in this list gradually turned a normal green about June 1, after which little variation in their colors could be noted. Not all spring foliage colors are reported here for there are many trees and shrubs (the oaks for example) the foliage of which does not appear until mid May. These have not been recorded. Added to foliage colors are the hundreds of flower colors, the two combining to make the early spring so colorful. The Norway maple, for instance, is at first a clear yellow, not because of its foliage, but because the flowers appear before the leaves. Then as the flowers gradually fade, the green leaves appear and the general appearance of the tree changes from yellow to green. Such color changes are multiplied by the hundreds in spring. The following lists should prove helpful to all who wish to anticipate foliage colors in early spring:—

DECIDUOUS WOODY PLANTS SHOWING THE FIRST FOLIAGE COLORS PRIOR TO APRIL 25, 1942

Green

<i>Abelia biflora</i>	<i>Euonymus macroptera</i>
<i>Berberis amurensis</i>	<i>Euonymus sachalinensis</i>
<i>Berberis Dielsiana</i>	<i>Euonymus sanguinea</i>
<i>Berberis Francisci-Ferdinandi</i>	<i>Lonicera bella</i> and varieties
<i>Berberis Gilgiana</i>	<i>Lonicera chrysantha</i>
<i>Berberis koreana</i>	<i>Lonicera notha</i>
<i>Berberis notabilis</i>	<i>Lonicera Ruprechtiana</i> and varieties
<i>Berberis ottawensis</i>	<i>Lonicera tatarica latifolia</i>
<i>Berberis Purdomii</i>	<i>Lonicera tatarica Leroyana</i>
<i>Berberis reticulata</i>	<i>Lonicera Xylostium</i>
<i>Berberis Vernae</i>	<i>Malus robusta persicifolia</i>
<i>Cotoneaster divaricata</i>	<i>Prinsepia sinensis</i>
<i>Cotoneaster foveolata</i>	<i>Prunus Padus sibirica</i>
<i>Cotoneaster lucida</i>	<i>Prunus Padus Spaethii</i>
<i>Deutzia glabrata</i>	<i>Pyrus ussuriensis</i>
<i>Euonymus europaea chrysophylla</i>	<i>Ribes</i> , many species
<i>Euonymus Maackii lanceolata</i>	<i>Spiraea lucida</i>

Yellow Green to Pale Green

<i>Acanthopanax Sieboldianus</i>	<i>Acer palmatum heptalobum</i>
<i>Acer campestre</i>	<i>Aesculus Dupontii Hessei</i>
<i>Acer Mono</i>	<i>Artemisia sacrorum</i>
<i>Acer Negundo</i>	<i>Malus robusta</i>

Prunus Padus commutata
Prunus Padus glauca
Rhamnus Schneideri
Ribes alpinum
Ribes luridum
Ribes odoratum

Rosa cinnamomea
Salix alba vitellina
Salix Matsudana
Salix rubra
Tilia japonica
Tilia platyphyllos sphaerocarpa

Dark Green

Chaenomeles japonica, most varieties
Chaenomeles lagenaria, most varieties
Ribes divaricatum

Ribes grossularia uva-crispa
Ribes innominatum
Ribes robustum

Gray Green

Amelanchier asiatica
Amelanchier canadensis
Amelanchier sanguinea

Maackia Fauriei
Prinsepia uniflora

Bronze to Reddish

Acer griseum
Acer platanoides Schwedleri
Acer rubrum
Amelanchier laevis
Berberis Thunbergii atropurpurea
Cercidiphyllum japonicum
Corylopsis Veitchiana
Diervilla sessilifolia
Lonicera Maximowiczii sachalinensis

Maddenia hypoleuca
Paeonia suffruticosa
Pyrus ussuriensis hondoensis
Rhus aromatica
Vaccinium angustifolium laevifolium
Viburnum cassinoides
Viburnum fragrans
Viburnum Opulus nanum

WOODY PLANTS WITH LEAVES VARIEGATED OR COLORED THROUGHOUT THE GREATER PART OF THE GROWING SEASON OF 1942

In the following lists are recorded those plants which have colored foliage (some color other than a medium or neutral green which makes the plant stand out from the surrounding background) throughout the growing season or a part of it. Plants appearing under a certain color heading have foliage of that color from the time the leaves first appear until the fall, unless another notation or date is indicated. "Normal by 7/6" means that the leaves of a particular plant have turned a normal green on or slightly before July 6, 1942. If no notes appear, the leaves remained colored throughout the season. Certain allowances must be made however, for the colors of the young foliage is considerably more brilliant than that of mature foliage. Thus in *Berberis Thunbergii atropurpurea*, the leaves of this plant first appear as a vivid scarlet and gradually fade to red. Some plants in the "blue-green" list may border on the "gray-green" or "purple-green."

It may be well to cite another example of a plant with colored foliage to show how widely a plant may vary in foliage color. *Kerria japonica picta* normally has

leaves with a light green leaf margin until July, after which time the leaf margin turns white. If a strong application of a nitrogenous fertilizer is given in June, the pale green margin may turn into a deeper green margin and remain so throughout the season. On the other hand, if the plant is grown in very poor soil, the margin may first appear white and remain white throughout the season. Another example is that of a golden-tipped form of *Tsuga canadensis* growing in Pennsylvania. It was noted by a bright-eyed nurseryman, and transplanted to his nearby nursery where the needles still had conspicuously golden tips. Then it was taken to "Far Country" or Hemlock Arboretum, the estate of Mr. Charles F. Jenkins, in Germantown, Philadelphia. Mr. Jenkins gave it every care including good soil, with plenty of nitrogenous matter. The tips turned a normal green and the tree could not be distinguished from any other specimen of *Tsuga canadensis* when I saw it last spring. A soil examination was made and the results show that the differences in the soil contents between Germantown and the original habitat of the tree may have been responsible for this change in color.

With these examples in mind, it can be readily understood that many plants may react differently under different conditions. The following notes record the foliage colors and their changes during the growing season of 1942 of all plants growing in the Arnold Arboretum with foliage any color except a normal green.

NOTES ON DECIDUOUS PLANTS WITH LEAVES VARIEGATED OR COLORED THROUGHOUT THE SEASON, (OR PART OF IT) 1942

Light Green

<i>Acanthopanax Sieboldianus</i> *	<i>Acer Negundo pseudo-californicum</i> *
<i>Acer japonicum</i>	<i>Catalpa bignonioides aurea</i> — normal
<i>Acer japonicum aconitifolium</i> — red-dish bronze 7/31 — 10/10 ⁺	by 7/31
<i>Acer Mono</i>	<i>Larix decidua</i>
	<i>Ribes cereum</i> *

Gray Green

<i>Amorpha canescens</i>	<i>Populus alba</i>
<i>Andromeda glaucophylla</i>	<i>Rosa Fedtschenkoana</i> — normal by 8/18
<i>Andromeda Polifolia</i>	
<i>Berberis dictyophylla</i>	<i>Rosa rubrifolia</i> — blue green
<i>Elaeagnus angustifolia</i> — gray	<i>Rosa rubrosa</i> "Carmenetta" *
<i>Elaeagnus umbellata</i>	<i>Salvia officinalis</i>
<i>Hippophae rhamnoides</i>	<i>Shepherdia argentea</i>
<i>Lonicera Korolkovii</i> — blue green	<i>Sibiraea laevigata</i>
<i>Lonicera microphylla</i> — blue green	<i>Zenobia pulverulenta</i>
<i>Lonicera prae floreus</i> *	

* Foliage turns a normal green by 6/30

⁺ This plant had light green foliage until approximately 7/31 when the foliage turned a reddish bronze and remained that color for the rest of the season.

Yellow to Yellow Green

- Acer japonicum aureum* — normal by 7/31
Acer Negundo auratum — beautiful golden 4/22 — 7/12, changing from bright yellow on 7/6 to greenish by 7/31, normal by 8/18
Cornus alba Rosenthalii — turning purplish red 9/5
Fagus sylvatica Zlatia — leaves yellow when young, normal by 7/12
Hypericum Dawsonianum — yellow green
Lespedeza kiusiana — yellow green
*Ligustrum Iboti vicaryi** — only young leaves yellow
by 6/30
Lonicera japonica aureo-reticulata — yellow leaves spotted green
Philadelphus coronarius aureus — yellow green; greenish by 8/18; green 9/5
Physocarpus opulifolius luteus — brilliant yellow 4/27; yellow green 6/10 — 7/5
(not outstanding); normal by 7/31
Pleioblastus distichus — foliage with leaves of varying stripes of green from yellow to dark green
Ptelea trifoliata aurea — young foliage yellow; mature foliage yellowish green; not outstanding
Pterostyrax corymbosa — yellow green
Stephanandra incisa — leaves vary from yellow green to dark green
Syringa vulgaris aucubaefolia — variegated yellow
Viburnum Opulus aureum — golden yellow 4/29; yellow green 6/10 — 9/5
Viburnum Sargentii flavum — young leaves yellow green
*Weigela praecox variegata** — variegated, dark green center, light green edge
Yucca filamentosa variegata — leaves yellow and green stripes

Red to Reddish Purple

- Acer palmatum atropurpureum*
Acer palmatum atropurpureum “Oshi Beni” — normal by 6/30
Acer palmatum crispum — normal by 8/18
Acer palmatum Hessei
Acer palmatum ornatum — eventually turning bronze green
Acer palmatum sanguineum — turning from a deep red to a bronze
Acer palmatum versicolor — 5/12 — 6/8 normal by 6/30 with some foliage a “yellowish pink”
Acer platanoides Schwedleri — bronze 5/22 — 6/30; dark green 7/31 — 9/5
*Acer platanoides Stollii**
Acer Pseudo-platanus purpureum — bronze green
*Aesculus carnea** — light bronze
Berberis Thunbergii atropurpurea
Berberis vulgaris atropurpurea — deep purple 4/24; reddish purple 5/22 — 7/31; almost normal by 8/18

Malus "Arrow"—early foliage a good bronze 5/22; changed to a distinct reddish green by 6/8; turns more green but also has a slight reddish hue until leaf fall

<i>Malus</i> "Berlini"	same as for <i>Malus</i> "Arrow"
<i>Malus</i> "Oekonomierat Echtermeyer"	" " " " "
<i>Malus purpurea</i>	" " " " "
<i>Malus purpurea</i> Eleyi	" " " " "
<i>Malus purpurea</i> Lemoinei	" " " " "
<i>Malus</i> "Red Flesh"	" " " " "
<i>Malus</i> "Red Silver"	" " " " "
<i>Malus</i> "Slocan"	" " " " "

Prunus blireiana Moseri—red to reddish purple

Prunus blireiana "Newport"—dark bronze 5/22—6/10; red 7/31; reddish purple 8/18—9/5

Prunus cerasifera applebiana—reddish purple

Prunus cerasifera atropurpurea—dark red 5/22—6/10; reddish purple 7/31—9/5

Prunus cerasifera nigra—dark bronze 5/22—6/30; reddish purple 8/18—9/5

Prunus cerasifera Woodii—dark red 4/22—6/10; purplish red 7/31—9/5

Prunus glandulosa rosea—red leaves streaked with some green

Prunus Persica atropurpurea—shining red, excellent 5/27—7/31; reddish purple 8/18—9/12

Prunus spinosa purpurea—dark bronze 6/10; reddish purple 7/31—9/12

Prunus "Vesuvius"—dark red 5/22—7/31; reddish purple 8/18—9/5

Weigela florida foliis-purpureis—purplish green

Weigela Maximowiczii—50% of leaves red or reddish, remainder green

Bronze

*Acer palmatum**—deep bronze 5/6; light bronze 5/22; green with slight reddish tinge 6/10

Acer palmatum dissectum—bronze green

Cotinus Coggygria purpurea—normal by 7/31

Fagus sylvatica—normal by 7/12

Rosa rubrifolia glaucescens*

Viburnum Opulus nanum*—bronze to bronze green

Purple

Acer platanoides rubrum—purplish red above, green below

Corylus maxima purpurea—mixed light and dark bronze by 6/10, old foliage normal by 7/31

Fagus sylvatica atropunicea—purplish green by 7/31

Note:—There are a number of forms of the purple beech, with varying intensities of foliage color. The lasting qualities also vary, possibly due to soil variations, some trees remaining with a purple foliage throughout

the season. Unfortunately, none of these forms are growing in the Arboretum.

Fagus sylvatica purpureo-pendula — purplish green by 7/31

Green with White Margin

Acanthopanax Sieboldianus variegatus — some green in leaves but mostly white and yellow 7/6; leaves pale yellow blotched with green 8/18 — 9/12

Acer Negundo “*crispum variegatum*”

Acer Negundo elegans — yellowish edge 5/22 — 6/10; white margin 7/31 — 9/5

Acer platanoides Drummondii — yellowish margin 8/18 — 9/12

Buxus sempervirens albo-marginata

Cornus alba argenteo-marginata

Cornus alba Gouchaultii — margins blotched white 6/22 — 6/30; blotched pink and white 7/31 — 9/12

Cornus alternifolia argentea — white margin with some pink

Cornus florida Welchi — white margin with some rose pink blotching

Euonymus Fortunei gracilis

Euonymus Fortunei “*Silver Queen*”

Kerria japonica picta — light green margin until 6/30; white margin 7/31 — 10/28

Green with Yellow Margin

Acer Negundo aureo-variegatum

Cornus alba Spaethii — leaf margin blotched

Cornus mas elegantissima — 6/8 — 9/5 pink in yellow margin, leaves look sickly

Ginkgo biloba Ridgelandii

Ligustrum ovalifolium aureo-marginatum

Weigela florida variegata — margin yellow green

Green with Red or Pink Margin

Acer palmata roseo-marginatum

Variegated

Berberis Thunbergii argenteo-variegata — 25% of leaves variegated white and pink

Lonicera tatarica Fenzlii — light and dark green variegated mottled 5/22 — 6/10, inconspicuous thereafter

Magnolia tripetala variegata — 10% leaves are variegated with yellow 5/22 — 9/5

Prunus cerasifera Hessei — leaf margins pink, yellow, white 7/6 — 9/12 (looks sickly)

Quercus robur argenteo-picta — some leaves are white and white spotted

40 Japanese Maple clons — various shades of red and green, not listed here because of similarity or questionable names, mostly showing various shades of red but a normal green by 7/31

EVERGREEN FOLIAGE COLOR

Light Green

- Chamaecyparis Lawsoniana* "erecta alba" leaf tips light green, normal by 8/18
Chamaecyparis thyoides Hoveyi — very light green, normal by 7/31
Taxus baccata variegata — young foliage yellow-green, leaves with light green center and yellow margin; older leaves normal green

Gray Green

- Chamaecyparis pisifera* squarrosa — gray green to blue green
Cryptomeria japonica — young leaves gray green
Picea glauca — gray green to bluish green
Picea mariana Doumetii

Yellow

- Chamaecyparis obtusa* aurea
Chamaecyparis obtusa "gracilis aurea"
Juniperus chinensis "japonica aureo-variegata"
Taxus cuspidata aurescens
Thuja occidentalis conspicua
Thuja occidentalis Ellwangeriana
Thuja orientalis decussata

Yellow Green

- Abies nephrolepis* — normal by 7/6
Chamaecyparis nootkatensis lutea
Chamaecyparis pisifera aurea — normal by 7/6
Chamaecyparis pisifera "filifera aurea" — normal by 7/6
Chamaecyparis pisifera "lutescens nana" — normal by 7/6
Chamaecyparis pisifera "nana aurea"
Chamaecyparis pisifera plumosa
Chamaecyparis pisifera "plumosa aureo-compacta"
Chamaecyparis pisifera "plumosa argentea"
Chamaecyparis pisifera "plumosa flavescens"
Juniperus chinensis aurea
Juniperus chinensis "Pfitzeriana aurea" — normal by 7/6 ?
Juniperus chinensis "plumosa aurea"
Juniperus communis "aurea spica" — normal by 7/6
Juniperus communis "depressa aurea" — normal by 7/6
Picea Abies aurea — normal by 7/6
Picea glauca aurea — normal by 7/6
Pinus pumila — normal by 7/6
Taxus baccata aurea — normal by 7/6
Taxus canadensis aurea — young foliage tips yellowish green
Thuja occidentalis aurea — normal by 7/6
Thuja occidentalis lutea

Thuja occidentalis pulcherrima — normal by 7/6

Thuja occidentalis “*robusta lutea*”

Thuja occidentalis “*Waxen*”

Thuja orientalis conspicua — young foliage yellowish green

Blue Green

Abies Fraseri prostrata

Abies lasiocarpa

Abies Vilmorinii

Chamaecyparis Lawsoniana “*robusta glauca*”

Chamaecyparis nootkatensis

Chamaecyparis pisifera minima

Chamaecyparis pisifera “*squarrosa intermedia*”

Chamaecyparis pisifera “*squarrosa nana*”

Chamaecyparis thyoides glauca

Juniperus chinensis oblonga

Juniperus chinensis Reevesi

Juniperus chinensis sylvestris

Juniperus communis

Juniperus glaucescens

Juniperus recurva

Juniperus Sabina prostrata

Juniperus scopulorum

Juniperus scopulorum “*Cologreen*”

Juniperus scopulorum glauca

Juniperus seravshanica

Juniperus squamata

Juniperus squamata Meyeri

Juniperus turkestanica

Juniperus virginiana Burki

Juniperus virginiana glauca

Juniperus virginiana McCabei

Juniperus virginiana reptans

Picea bicolor

Picea Glehnii

Picea montigena

Picea pungens

Picea pungens globosa

Pinus flexilis reflexa

Pinus monticola

Pinus parviflora

Pinus sylvestris

Pinus sylvestris fastigiata

Pinus sylvestris lapponica

Pinus sylvestris Watereri

Pseudotsuga taxifolia — varies from green to blue green

Blue

Abies amabilis

Abies concolor — from light blue to blue green varying on different trees

Abies concolor violacea — young foliage blue

Abies lasiocarpa arizonica

Abies lasiocarpa compacta

Chamaecyparis obtusa ericoides

Chamaecyparis pisifera “*squarrosa pygmaea*” — light blue 7/31

Juniperus chinensis “*densa glauca*”

Juniperus communis echinaeformis

Juniperus scopulorum columnaris

Juniperus scopulorum Gareei

Juniperus scopulorum “*Hill's Silver*”

Juniperus scopulorum “*Marshall*”

Juniperus scopulorum “*Marshall Silver*”

Juniperus scopulorum “*Medora*”

Juniperus scopulorum “*Moonlight*”

Juniperus virginiana “*glauca Hetzi*”

Juniperus virginiana pseudo-cupressus

Juniperus virginiana venusta

Picea Engelmanni

Picea pungens argentea

Picea pungens Kosteriana

Picea pungens Moerheimi

Leaves Whitish Underneath
(giving a grayish appearance at a distance)

<i>Abies alba pyramidalis</i>	<i>Picea jezoensis hondoensis</i>
<i>Abies homolepis</i>	<i>Picea notha</i>
<i>Abies homolepis umbellata</i>	<i>Picea Omorika</i>
<i>Abies Veitchii olivacea</i>	<i>Pinus parviflora glauca</i>
<i>Picea Abies elegans</i>	

Variegated

Taxus baccata “fastigiata aurea” — margin of leaves yellow

EARLY COLORED AUTUMN FOLIAGE

Lists have already been published in a previous issue of the **Bulletin of Popular Information**, Series 4, Vol. IV, No. 14, 1936, of trees and shrubs which have specific autumn colors. No mention was made of those species which may be listed as turning color early in the fall; that is, actually the first to take on autumn coloration in the Arnold Arboretum. The following list shows those plants which began to turn color prior to September 1, 1942. This is very early, especially when it is understood that autumn color was not predominantly evident in the Arboretum until about October 7, and did not reach its peak until about October 14 this year. However, there are always plants which can be expected to change color early or at least begin to change color before the majority of other plants, as indicated by the following list. It should be noted that the season, the situation in which a plant is growing, the amount of rainfall and its seasonal distribution, all combine to determine the actual dates on which fall color first is evident and these dates vary from year to year. The following species are always the first to start the color procession.

WOODY PLANTS SHOWING THE FIRST AUTUMN COLOR
(ON OR PRIOR TO SEPTEMBER 1, 1942)

Abeliophyllum distichum — yellow green
Acanthopanax sessiliflorus — yellow green
Acer rubrum — few turning red
Acer rubrum Schlessingeri — turning red (holding its leaves fully colored until 10/1)
Aronia species and varieties — turning red and yellow
Berberis amurensis — turning deep red
Berberis Bretschneideri — 25% turning bright red
Berberis dasystachya — turning to red
Berberis Francisci-Ferdinandi — bronze green
Berberis Purdomii — turning deep reddish purple
Berberis Thunbergii — yellows and reds starting to appear
Berberis Thunbergii Maximowiczii — turning bronze
Callicarpa dichotoma — yellow green with little purple

Carpinus laxiflora — young leaves turning red
Cercidiphyllum japonicum — few turning color, some leaves yellow and some bronze
Cornus alba — turning reddish purple
Cornus Amomum — turning bronze red
Cornus florida — few trees showing much red fall coloring (probably due to location and soil conditions)
Dirca palustris — turning yellow green
Euonymus alata — turning red
Euonymus Bungeana — trees vary — some turning yellow and others turning red
Euonymus europaea — turning reddish
Euonymus oxyphylla — turning red
Euonymus sachalinensis — many leaves turning red
Euonymus sanguinea — deep bronze
Hydrangea Bretschneideri glabrescens — turning yellow and brown and dropping
Lindera Benzoin — turning yellow green
Parthenocissus quinquefolia — few leaves turning red
Phellodendron amurense — few trees already turned bright yellow
Physocarpus bracteatus — 50% turning brown with a little red
Prinsepia sinensis — 25% turning bright yellow
Prunus Padus commutata — 50% bright red and dropping
Rhododendron yedoense poukhanense — few plants with leaves turning bronze red
Ribes aureum — starting to turn red
Ribes odoratum aurantiacum — 75% now deep red
Ribes odoratum praecox 50% of leaves bright red
Rosa carolina glandulosa — turning dark red
Rosa Roxburghii and varieties — turning bronze
Rosa setigera serena — turning bronze red
Securinega suffruticosa — turning yellow and dropping
Spiraea alba — turning yellow brown
Spiraea salicifolia — turning bronze
Stewartia ovata grandiflora — turning brown and purple
Tilia euchlora — 50% yellow
Vaccinium angustifolium laevifolium — bronze green and red
Vaccinium canadense — bronze green and red
Vaccinium corymbosum glabrum — turning red
Vaccinium Oldhamii — turning deep red
Vaccinium tomentosum rotundifolium — 50% of leaves dark red and green

DONALD WYMAN

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